

APRACA FinServAccess Programme  
**Value Chain Financing in Agriculture:  
Condition, Strategies, Practices and  
Experiences in Nepal**





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# Value Chain Financing in Agriculture: Condition, Strategies, Practices and Experiences in Nepal

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# Preface

The need to share the innovations, practices, lessons learnt, and experiences of the Asia-Pacific Rural and Agricultural Credit Association (APRACA) member institutions is a continuous process within the rural finance and development network in the region. This is done through several means which enables every institutional member including its officers, partners and most especially the clientele to be technically equipped, financially secured and developmentally prepared and sustainable.

With the support of the technical experts and practitioners across the region, APRACA has boosted its programs and activities in improving the institutional development and capacities of its members in research and development and knowledge management.

One of the important aspects being supported by APRACA in rural finance and development is the documentation of agricultural value chain finance (AVCF) strategies, innovation, interventions and experiences in the field. For the past years, AVCF experiences from selected countries set the pace in knowledge acquisition and exchange. It has allowed and encouraged intellectual discussion to solicit additional ideas, insights and perspectives.

This year, APRACA through the IFAD FinServAccess Grant Project continues to support the documentation of AVCF to strengthen its knowledge-based at the regional level. We heartily express our gratitude to IFAD, our institutional members and their clientele for documenting and sharing their work.

This document is part of a series of publication meant to support the AVCF training modules/resource book as a means for teaching-learning tool for key players, practitioners and stakeholders in rural finance and development. The countries documented include Bangladesh, Lao PDR, Malaysia, Nepal and Pakistan.

We hope that this document will be useful to enhance and strengthen capacities of those interested to learn further the aspect of agricultural value chain finance within strategic locations in increasing productivity, profitability and sustainability especially in the countryside.

# Acknowledgements

This publication is comes in a series based on an analytical study which was commissioned by the Asia-Pacific Rural and Agricultural Credit Association (APRACA) through the International Fund for Agricultural Development (IFAD) grant project, the FinServAccess project to technical experts and researchers. It was designed to meet the needs of the growing demand of domain knowledge on financing agriculture value chains in the Asian region focusing on Nepal finance and agriculture sectors.

We would like to express our sincere appreciation to the following individuals and institutions in coming up with this wonderful output possible:

- Dr. Sunity Shrestha Hada, retired Professor of Trivubhan University and the President of the Operational Research Society of Nepal taking the lead in researching the Nepal AVCF cases and sharing her expertise and valuable time to meet and interact with the key players and stakeholders of the Nepalese rural finance and agricultural development. Together with her team, Mr. Ghuran Thakur, former senior officer ADBL and now development consultant and Mr. Krishna Nakarmi, section head of ADBL for their contribution and effort in completing the research;
- Mr. Lila Prakash Sitaula, Chief Executive Officer of the Agricultural Development Bank Limited (ADBL) for his support and commitment to share the experiences of the bank in order that other rural finance and banking stakeholders and clientele will understand and learn some important AVCF supported commodities;
- Various departments, institutions and ministries of Nepal particularly the Nepal Rastra Bank (NRB), the different rural finance and microfinance institutions, Ministry of Agricultural Development, Ministry of Commerce and Industry, farmer and fishery groups and cooperatives for sharing documents for analysis and review and experiences to strengthen the cases documented;
- The farmers including their businesses particularly the carnation production system, rainbow trout aquaculture and the tomato production system;
- The International Fund for Agricultural Development (IFAD) for its financial support extended to the research team and the publication of this document; and
- The readers/users of this document as more and more stakeholders and practitioners take part in having an intellectual discussion on the aspect of value chain finance in agriculture not only in Nepal but other countries as well. We encourage you to review and understand/question further in order that we can serve and provide the most appropriate and relevant practices in creating opportunities in rural finance and development across our region and the whole world.

# Executive Summary

Agricultural Value Chain Financing (AVCF) is one of the prudent tools in the agricultural financing process. In the country like Nepal this concept of agricultural farming needs to be taken as an indispensable tool for the enhancement of productivity as a whole. In the recent time, nearly 70 percent of population of Nepal is engaged in agricultural sector but that engagement is still not able to feed the entire population. Nepal is still dependent on neighboring countries to fulfill the need of agricultural products due to its subsistence farming mechanism. In a reality, for the country like Nepal where commercialization is an evitable process for sustainability of agricultural sector, the AVCF can be a pathway to usher the country towards agricultural sustainability.

The present AVCF research documentation conducted describes the three important commodities in Nepal agricultural development. These are carnation for floriculture, rain trout for aquaculture or fish farming and tomato for vegetable production. The commodities are all supported by the Agricultural Development Bank Limited (ADBL) with technical support from the Ministry of Agricultural Development and local government agencies.

The document is divided into four chapters; namely Chapter 1 – Introduction, Chapter 2 – Agricultural Value Chain Finance Condition in Nepal, Chapter 3 – Three cases in review, and Chapter 4 – Summary, Conclusion, Recommendation and Implication.

Results show that agricultural value chain finance in Nepal is considered as one of the emerging and expanded services intended to the rural people especially the farmers/fishers and livestock raisers, traders and entrepreneurs. The services come in two forms, technical and financial support. These are provided by established financial institutions in the form of financial resources to fund simple agricultural structures (e.g. fishponds and protective structures) and technologies for effective and efficient production management system. It was noted that technical and financial services have improved the production and sustainability of the agricultural commodities and contributed in the improvement of the living conditions of the farmers. In turn, the farmers/fishers became the lead resource practitioners invited by ADBL as speakers in inspiring other farmers especially the youth to engage in farming/fishing and or as an integrated system for rural and agricultural development.

Although there are issues and constraints identified, these could be addressed properly with the support extended by government, non-government organizations as well as the local cooperatives and groups working on the different commodities. On the other hand, the potential and expansion of these commodities showed positive results addressing the demands of the market both domestic and international. As such, AVCF has a great potential in uplifting the agricultural sector with an efficient access to finance strategies employed by the key players and stakeholders especially for the rural areas – high and mid hill and mountainous areas.

# Acronyms

ADBL	Agricultural Development Bank Limited
ADS	Agricultural Development Strategy
AEC	Agro Enterprise Centre
AVC	Agricultural Value Chain
AVCF	Agricultural Value Chain Finance
A2F	Access To Finance
BEP	Break Even Point
BCR	Benefit Cost Ratios
CFL	Central Fish Laboratory
DADO	District Agricultural Development Office
DoA	Department of Agriculture
ESAMI	Eastern and Southern African Management Institute
FAN	Floriculture Association of Nepal
FDC	Flower Development Centre
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
HDD	Horticulture Development Directorate
NARC	Nepal Agricultural Research Council
MoAD	Ministry of Agricultural Development
NEFSCUN	Nepal Federation of Savings and Credit Cooperative Unions Ltd.
NGOs	Non-Government Organizations
NIFAND	National Inland Fisheries and Aquaculture Development
NRB	Nepal Rastra Bank
PC	Pythosanitary Certificate
PACT	Project for Agriculture Commercialization and Trade
RED	Regional Agricultural Directorate
RTGRC	Rainbow Trout Genetic Resource Center
SACCOS	Saving and Credit Cooperative Societies
SCCS	Savings and Credit Cooperatives Societies
SHG	Self-Help Groups
VCF	Value Chain Finance

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# CHAPTER 1

## Introduction

### 1.1 Background

Agricultural Value Chain Financing (AVCF) is one the prudent tools in the agricultural financing process. In the country like Nepal this concept of agricultural farming needs to be taken as an indispensable tool for the enhancement of productivity as a whole. In the recent time, nearly 70 percent of population of Nepal is engaged in agricultural sector but that engagement is still not able to feed the entire population. Nepal is still dependent on neighboring countries to fulfill the need of agricultural products due to its subsistence farming mechanism. In a reality, for the country like Nepal where commercialization is an evitable process for sustainability of agricultural sector, the AVCF can be a pathway to usher the country towards agricultural sustainability.

As a matter of fact, agriculture value chain refers to full range of activities including the involvement of farmers/producers, traders, processors, marketing companies, financial institutions and service providers. Financial service may need at many levels in the chain or could enter the chain at one point and then flow up and/or down through the chain to others.

### 1.2 Research Questions

- What are the reasons of relevancy of agricultural value chain finance to the farmers of floriculture, vegetables and aquaculture?
- How can Nepalese farmers improve access to the rural finance from financial institutions?
- What are the descriptions and features of the identified best practice/innovations in AVCF in Nepal?
- How do the identified best practice/innovation farmers improve performance of rural institutions or lenders in terms of outreach and service delivery?

### 1.3 Objectives

The general objective of the project is to identify and document the best practices and innovations on value chain finance in three different areas of agriculture in Nepal, that are, floriculture (Carnation), vegetables (Tomato) and aquaculture (Trout fish).

**The specific objectives are:**

- To undertake desk studies related to AVCF in Nepal
- To identify and document the best practices and innovations of the value chain finance in agriculture in Nepal
- To assess best practices and innovations in support to enhance the productivity and profitability of Nepalese farmers
- To examine the best practices and innovations in Nepalese agricultural sector, its contributing and limiting factors sustainable to rural finance service delivery systems

## 1.4 Methodology

### Research design

An analytical and survey research design has been adopted to achieve the objectives.

### Population and sample

Agricultural Development Bank Limited Nepal (ADBL) is the major formal financing institution in the country contributing in the agricultural sector since its inception in 1968. As such, ADBL clients in each product, namely floriculture, fisheries and vegetable were considered for this study. The floriculture production is done in 35 districts of the country. There are 62 flower retailers in the country. This study focused on Kathmandu district and the case of "Kumari Flora" Chitlang, Makwanpur is considered for the study of 'carnation cut flower'. In Nepal, the number of farmers involved in growing rainbow trout fish is listed to be 73 and Himali Rain bow Trout, Betini, Nuwakot is selected for this study. There are 33 wholesale market of tomato throughout the country. Among them case of Mr. Krishna Prasad Ghimire, of Jeevanpur VDC of Dhadhing, has been selected for this study.

## 1.5 Organization of the Paper

This paper is organized in five chapters. The first chapter comprises of introduction that includes objective and methodology, the second chapter includes the general framework of AVC and improving access to rural financing, the third chapter presents and discusses three cases on carnation, trout and tomato value chain financing with best practice in Nepal, the fourth chapter summarizes the whole issues of AVCF with references to the three selected cases, the constraints and possible way out of the challenges; and the fifth chapter concludes the findings of the whole paper and suggests measures to improve AVC financing in Nepal.

## CHAPTER 2

# Agricultural Value Chain and Improving Access for Rural Finance

## 2.1 Background

The financing in value chain is most important to uplift the people involved in each processes. In Nepal the financing in this sector is in existence from very beginning with various financing tools.

Value Chain financing exists in Nepal through three main sectors, informal sectors (money lenders, dadani system, friends and relatives), Semi-formal banks (saving and credit cooperatives, MFI's) and formal sectors that includes the commercial banks and specially, the ADBL. NRB has observed that 38 percent of financial activities in Nepal is covered by formal sector where as 62 percent still rely on semi-formal and informal sectors (Kafle, 2013).

### 2.1.1 Informal Sector Financing

The informal sector still prevails in rural sector and even some in urban sectors. The high and unscientific tools of informal way of financing sometimes result in heavy loss to the farmers and might not prove to sustaining financing tool to them. The informal sector includes friends and relatives, money lenders, local merchant and dadani system. In this system, the interest rate with money lenders and the local merchant is very high that might range from about 30 percent even up to 100 percent.

Under the dadani system, farmers access loans from the traders or merchants to whom they normally sell their produce in return for a certain amount of their harvest at a pre-determined rate, irrespective of market prices at the time of harvest. (mercy crops). This type of loan is mostly used for consumption purpose or to use in festival or social purpose during the lean seasons. The farmers never overcome repaying the loan as the money is not invested in the productive sectors, making the farmers in more trouble financially. The inability of farmers to access the formal market they lose the competitive price of their agriculture products.

In this sector the farmers do not enter the value chain in real sense in any stages of the production cycle and they are trapped in debt throughout their life.

### 2.1.2 Semi-formal Sector Financing

The semi-formal sector comprises savings and credit cooperatives, societies, microfinance institutions and financial intermediary NGOs (FINGO's). Savings and Credit Cooperatives Societies (SCCS) have been created in Nepal through different processes. The history of institutional credit in Nepal began in 1953 with the establishment of a Cooperative Department. In 1956 in Chitwan valley Bakhan Singh Saving and Credit Cooperative in Sharada Nagar was the first one to start in non-government sector. Most of the commercial bank's activities have found to be concentrated in and around accessible regions only. Such vacuums of finance have been mitigated by microfinance development banks, cooperatives, financial NGOs and self-help groups (SHG).

The involvement of the users themselves in the cooperative system makes the SCCS more reliable and helpful in the period of cash crunch. In rural sector, in absence of formal sector institutions this semi-formal sector is highly effective. Although the experience shows that the operating cost in these cooperatives is very high but because of the outreach in remote areas of the country it is still better alternative of value chain financing in agriculture.

According to ADS 2015, Cooperatives, FINGOs and SHGs are the best carrier of rural finance activities particularly in remote/rural areas. They are involved with saving, credit, remittance; etc., activities on behalf of poor rural households. The vacuum of financial institutions such as commercial banks, development banks has been mitigated by such institutions.

The number of cooperatives is operating effectively not only in rural sector but in many cities also.

The structure of NEFSCUN and their activities are represented in building capacity of the farmers through training and others. The members in SACCOS are increasing heavily. Some cooperatives are product specific and strengthen the farmers involved. Multi-purpose cooperatives constitute 13.2 percent of the total cooperatives in Nepal. The structure of NEFSCUN and their activities are represented in building capacity of the farmers through training and others. The detail is presented in Table 2.1.

**Table 2.1. No of saving and credit cooperative societies (SACCOS) and members associated with NEFSCUN**

Description	2011	2012	2013	2014
District Unions	39	51	56	57
SACCOS	1,097	1,663	1,983	2,223
Total	1,136	1,714	1,949	2,280
Members (Million)	1.0	1.3	1.55	1.8
<b>Capacity Building (Training)</b>				
No of Training/Workshop		149	241	112
Total Participants		5,291	6,618	3,279

Source: NRB 2015

The pace of social inclusion such as access of education and health and others is very slow in rural areas. As a result, rural poor household members lag the knowledge on the credit, use of credit and various sources of credit at local level.

The product specific cooperatives are more helpful to the farmers involved in milk cooperatives, the vegetable cooperatives and even coffee and beekeeping cooperatives activities (Table 2.2).

**Table 2.2. Status of Cooperatives in Nepal 2014**

Nature of cooperative	Total	%
Saving and Credit Cooperatives	13,368	42.88
Agriculture	8,069	25.88
Multipurpose Cooperatives	4,114	13.20
Milk Cooperatives	1,732	5.56
Consumer Cooperatives	1,426	4.57
Electricity Cooperatives	429	1.38
Vegetable and Fruit Cooperatives	202	0.65
Tea Cooperatives	109	0.35
Coffee Cooperatives	146	0.47
Herbal Cooperatives	192	0.62
Bee keeping Cooperatives	67	0.21
Communication Cooperatives	121	0.39
Health Cooperatives	92	0.30
Sugarcane Cooperatives	47	0.15
Junar (citrus) Cooperatives	44	0.14
Others	1,019	3.27
<b>Total</b>	<b>31,177</b>	<b>100</b>

### 2.1.3 Formal Sector Financing

The commercial banks ranked by NRB as class A, B and C constitutes the formal sector financial institutions. The first commercial bank, the Nepal Bank Ltd. was established far before the Central Bank, Nepal Rastra Bank which led Nepalese economy towards formal banking system. Among the formal rural finance providers, public rural finance institutions are predominant and three institutions—ADBL, Small Farmers Development Bank, and the regional development banks (Grameen Bikash Banks)—account for more than 60 percent of the rural finance outreach from the formal and semiformal institution. The details of the financial institutions within the two decade period are presented in Table 2.3. The Grameen Bikash Banks with Bangladesh model came into Nepal during 1992/93. The main focus of Agricultural Development Bank Limited (ADBL) since its inception in 1968 has been the provision of credit facilities and technical assistance for the development and modernization of agriculture and allied industries. Analysis of data of Nepal Rastra Bank clearly showed that contribution of ADBL in agricultural portfolio among commercial banks was 85 percent in 2012.

**Table 2.3. The Number of Financial Institutions in Nepal**

Financial Institutions	1995	2000	2005	2010	2014
Commercial Bank (Class A)	10	13	17	27	30
Development Bank (Class B)	3	7	26	79	75
Finance Company (Class C)	21	45	60	79	48
Microcredit and Dev. Bank	4	7	11	18	36
Savings & Credit Cooperatives	6	19	20	16	16
Microfinance NGO		7	47	45	37
<b>Total</b>	<b>44</b>	<b>98</b>	<b>181</b>	<b>264</b>	<b>242</b>

Currently there are 30 commercial banks in Nepal with 75 development banks and 48 finance companies. The number of commercial and other banks might change due to recent events of merging and acquisition of banks. There are altogether 89 cooperatives, micro credit and micro finance companies for financing in Nepalese market. In order to enhance access to finance among rural deprived borrowers, Category A, B and C BFIs are required to lend 4 percent, 3.5 percent and 3 percent respectively of total loans and advances to the deprived sector. In the NRB directive, 'deprived' is defined as low income and especially socially backward women, tribal people, Dalit (untouchables), blind, hearing impaired and physically incapacitated persons, marginalized and small farmers, craftsmen, labor and landless squatter families (A2F, 2015).

ADBL is dedicated to the agriculture sector of Nepal. Table 2.4 below shows the percentage share of ADBL and the class A commercial banks in various sectors of agriculture in Nepal. It depicts that the total outstanding of ADBL in comparison to other commercial banks is 29 percent, 31 percent and 30 percent in 2012, 2013 and 2014 respectively.

**Table 2.4. ADBL contribution in Agriculture Sector (NPR in millions)**

Loan Portfolio	2012			2013			2014		
	Class A	ADBL	ADBL %	Class A	ADBL	ADBL %	Class A	ADBL	ADBL %
<b>Agricultural and Forest Related</b>	23,209.6	10,161.8	43.78	31,031	13,239	42.7	37,810.8	14,720	38.9
<b>Fishery Related</b>	1,775.6	525.25	29.58	500.3	398.7	79.7	2,491.48	492.4	19.8
<b>Agro Production related</b>	41,212.2	2,417.48	5.87	176,662	3,216	1.8	207,143	3,493	1.69
<b>AG Total</b>	66,197.4	13,104.55	19.8	208,193	16,854	8.1	247,445	18,705	7.56
<b>Total Outstanding</b>	622,575.2	45,337.64	7.28	757,208	54,956	7.3	902,162	62,454	6.92
<b>% of Ag</b>	11	29		27	31		27	30	

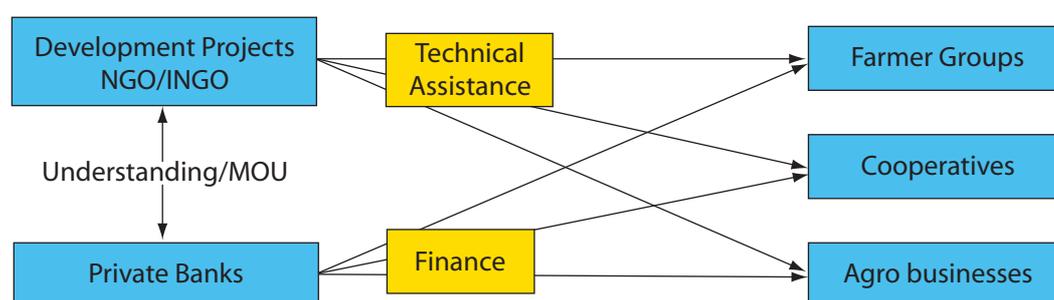
Source: ADBL, 2015

## 2.2 The Agriculture Value Chain Financing

However, while the capital and technologies available to these banks are assets, the knowledge and practices of these banks to work with remote and rural clientele is inadequate. For this reason, many banks are working with development projects to gain an understanding of the context before opening branches or expanding operations. In most cases, these development projects give non-financial guarantees by way of assurances, technical assistance, and guarantees to the clients in order to provide banks with a psychological impetus to expand into non-familiar environments (Mercy Crops, 2010).

The figure below reveals that the borrowers at individual farmer level, at cooperative level and agribusiness level as a whole not only gets financial support but is benefited by technical advisory support too.

**Figure 2.1. Development projects and commercial banks**



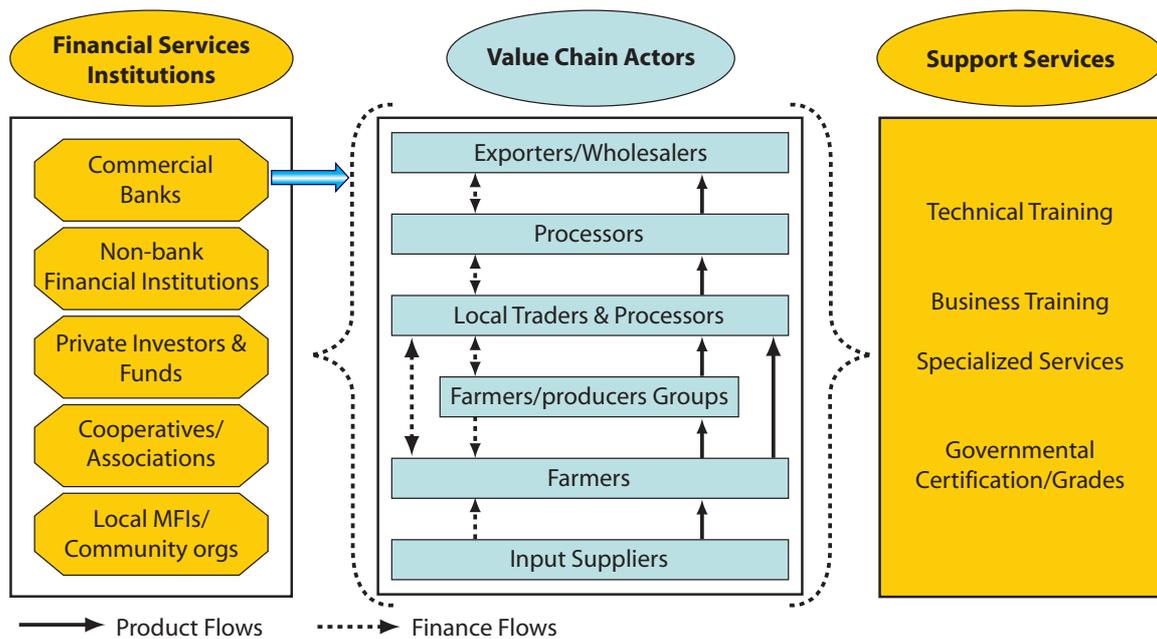
Source: Mercy Crops, 2010

The financing of agriculture value chain at various stages is not limited to following attributes as shown in Table 2.5.

**Table 2.5. Feature of Activities in Agriculture Value Chain**

Actors in Chain	Description
Primary farmers/producer	Farmers of cereal crops, cash crops, horticulture crop, floriculture, vegetables, beverages, plantation crops and others
Farmers, community	Warehouse, cold storage
Farm mechanization	Agriculture tools such as, tractor, power tiller, thrasher, sprayer, duster, planters and others
Processing factory	Tea, rice, oil, pulse, sugarcane, milk products, fruit products, vegetable products
Marketing/Trading through cooperatives and individual entrepreneurs	Inputs such as seed, fertilizer, pesticides, plant protection, micro nutrient Output such as, purchasing of cereal, oil crop, pulse, non-timber forest products Grocery shop, department store

The value chain in Figure 2.2 clearly explains the linkages and flow of internal and external actors. The sustainability of the VC depends upon the strength of the relationship between those actors vertically as well as horizontally. Most VC approaches have several common characteristics, including: a market perspective; a focus on end markets; a recognition of the importance of relationships between different links in the chain, attention to improving value generation for the different participants in the chain and, empowering the private sector.

**Figure 2.2. Flow of Products and Finance along Value Chain**

Source: Miller & Jones, 2010

Apart from the internal arrangements, the sustainability of the chain will also be driven by external factors such as the business environment, especially the availability of support services, including the policy and regulatory environment, and the legal and contractual systems (African Bank 2013).

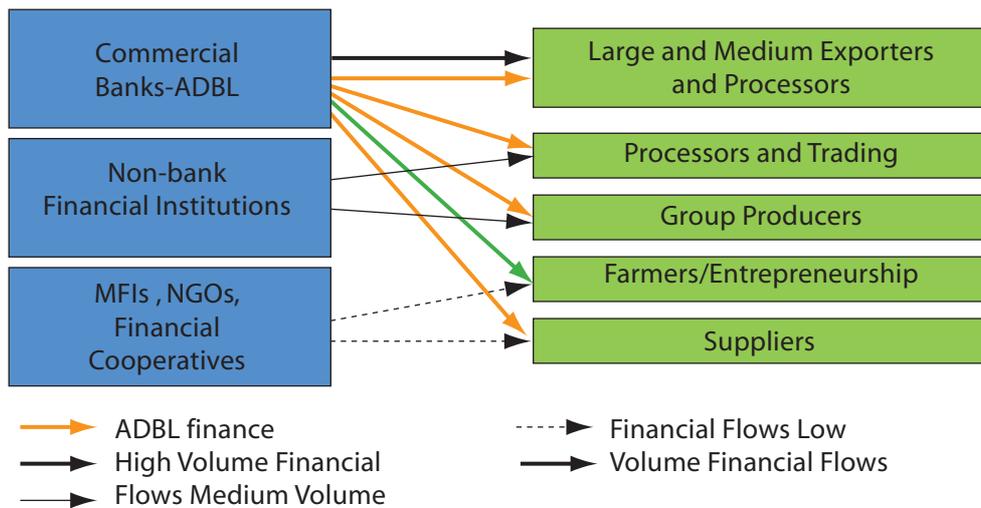
The Figure 2.2 is the standard form of agriculture value chain system of activities. The farmers from the stage of input supplies where their need of the seeds, fertilizers and other input materials are met by financing from three sectors, formal, semi-formal or informal mediums.

The farmers need agriculture financing by various financial sectors whereas, they need other support such as technical training, preparing business plan, some specialized services and governmental certification services. There are many agencies at government sector, private sector and other INGO's that support the farmers. There are NARC, MoAD, NRB, FNCCI/AEC, the product-wise association such as, floriculture for carnation, fisheries for trout and vegetable for tomato and so on, and other INGO's for technical and other support services.

The financing in various stages of the production cycle including input supply to marketing of the crop various financial institutions are operating. The ADBL is specially aimed to fill the vacuum of agriculture finance to unreach in Nepal. The Figure 2.3 describes the operational flow of fund to every actor in the agriculture value chain. The semi-formal sector institutions finance on initial phase to the input suppliers and the farmers and entrepreneurs. The commercial banks and ADBL supports all actors in the chain including the farmers; traders; small, medium and large processors, traders and exporters.

The operating processes are similar in almost all financial institutions where the farmers need collateral depending upon the type and volume of the credit. It has been observed that the repayment rate and repayment history of women is more efficient than that of men borrowers.

**Figure 2.3. Operations of Financial Institutions: Finance Value Chains**

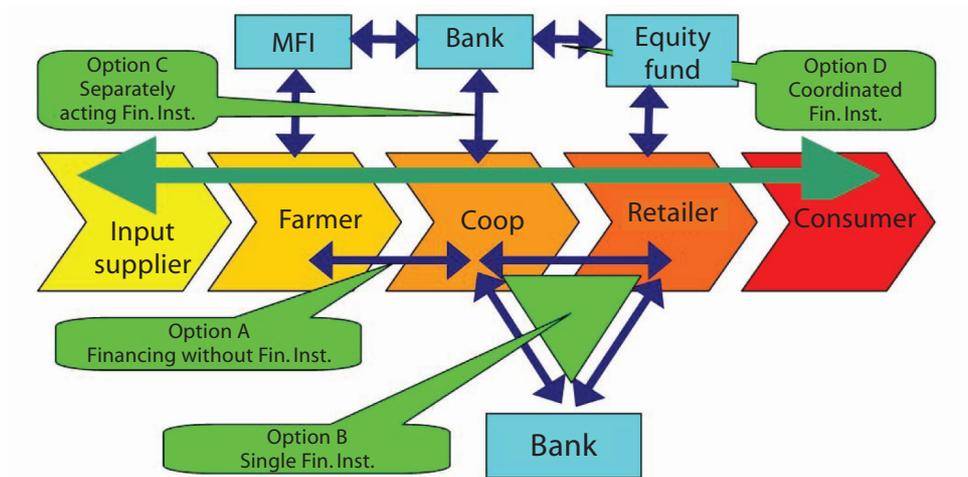


Source: Ghuran Thakur, 2013

## 2.3 Types of Financing

There are four types of value chain financing practiced in Nepal based on needs (GTZ 2010). These are self-financing, internal or direct financing, external or indirect financing and contract farming as shown in Figure 2.4.

**Figure 2.4. The Value Chain Financing**



Source: Microned 2009 (in GTZ 2010)

### Self-financing

Need of investment capital and also to some extent working capital can be covered by retained profits and by savings. Especially small farmers and small-scale businesses can benefit a lot from savings facilities and through them from loan products provided by savings and credit cooperatives.

### **Internal or direct financing**

This common type of value chain financing is internal financing from within the value chain, especially direct financing between the interlinked actors of the value chain (i.e. producers and one processor). Examples are:

- a marketing cooperative for honey advances credit to small-scale bee-keepers;
- a supply cooperative provides inputs (seeds) on credit to members and accepts payment after harvest time;
- a producer cooperative extends technical assistance to its members against nominal fees to be paid after harvest

### **External or indirect financing**

This type of value chain finance is provided by financial institutions (MFIs, savings and credit cooperatives, banks) from outside of the value chain. The examples are:

- short and longer-term loans for working capital or investment purposes,
- leasing of equipment for processing, storage, transport etc.
- insurance in order to mitigate risks of production or storage.

### **Contract farming (or out-grower schemes)**

It is a relationship between a buyer of agricultural produce and farmers. The latter may be organized in a producer cooperative or marketing cooperative.

The options for value chain financing as presented in the figure are as follows:

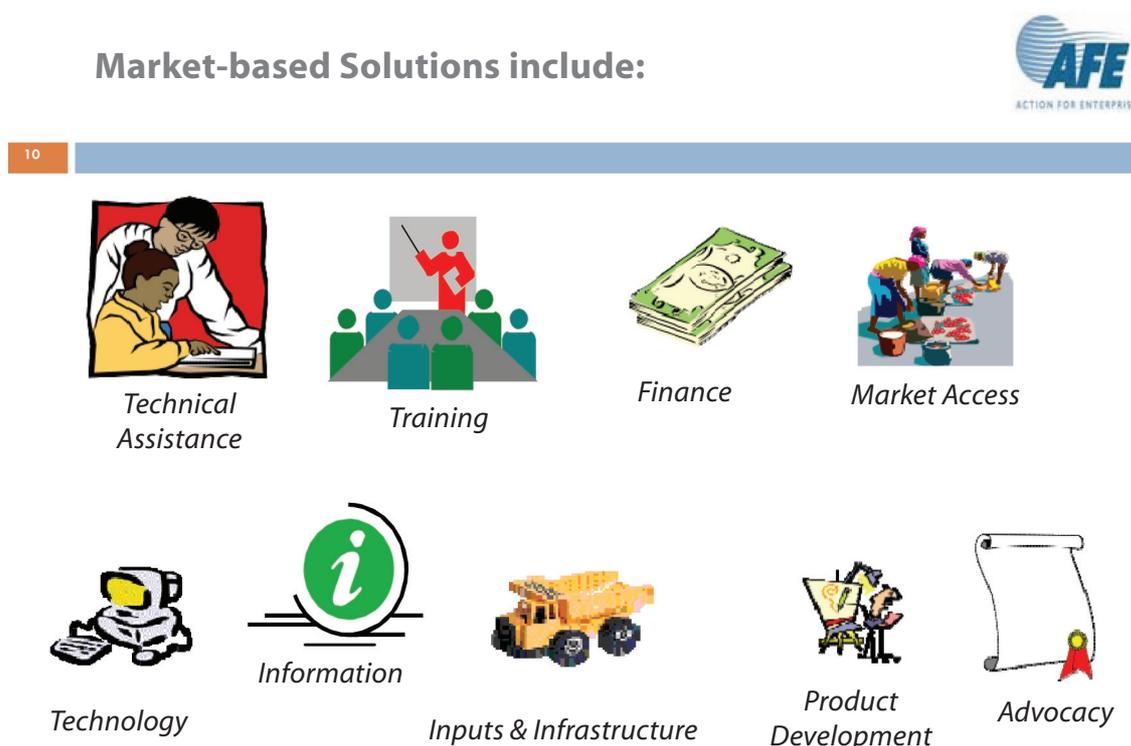
- Option A. Financing by value chain actors themselves along the value chain without involvement of financial institutions.
- Option B. Financing by one financial actor in a tripartite cooperation with two different types of value chain actors (two levels of the value chain).
- Option C. Financing of particular levels of the value chain (or types of value chain actors) by financial institutions acting separately from each other.
- Option D. Financing of the entire value chain by financial institutions in coordination with each other.

These are the options in practice in Nepal. The selected cases for this study observe these policies being adopted.

The agriculture value chain financing emphasizes on the market based solutions so that the farmers have multidimensional access to all the activities from pre-production activities to the final marketing of the product. The figure below as presented by AFE clears the financial support through agriculture value chain, all leading to a strong VCF and high productivity (Figure 2.5).

The study depicts that VCF approaches enhances export competitiveness, boosts sustainable agriculture development and improves financial inclusion in agriculture sector as shown in Table 2.6.

**Figure 2.5. Market Based Solutions**



Source: Action for Enterprise (AFE) 2015

**Table 2.6. Typical organization of smallholder production**

	<b>Driver of organization</b>	<b>Rationale</b>
Producer driven	<ul style="list-style-type: none"> <li>• Small-scale producers, especially when formed into groups such as associations or co-operatives</li> <li>• Large-scale farmers</li> </ul>	New markets Higher market price Stabilize market position
Buyer driven	Processors Exporters Retailers, traders, wholesalers and other	Assure supply Increase supply volumes Supply more discerning
Facilitator driven	NGOs and other support agencies National and local governments	Make markets work for the poor Regional development
Integrated	Lead firms Supermarkets Multi-nationals	New and higher value markets Low prices for good quality Market monopolies

Source: African Bank 2013 p. 19

## CHAPTER 3

# Case Studies on Value Chain Finance

### 3.1 Carnation Value Chain Finance

#### 3.1.1 Overview

Flowers are grown commercially in more than 120 countries around the world and marketed in virtually every location of the globe. The total size of the global flower trade was at least US\$ 40 billion in 2008 (PM Mitiambo: ESAMI, Floriculture Value Chain: A case of Kenya, 2008-2011) with the Netherland accounting for 54 percent of total export. The major flower exporting countries besides Netherlands are; Colombia (16 percent), Ecuador (6 percent), Kenya (6 percent), Italy (1.6 percent), Israel (1.4 percent) and others (15 percent). The most of the flower is consumed in Europe and USA, though Japan is prominence as per recent figures. The major global flower importers in terms of volume are; Germany (18 percent), UK (17 percent), USA (16 percent), France (9 percent), Netherlands (9 percent), Italy (4 percent), Japan (4 percent), Switzerland (3 percent) and other (20 percent) (Mitiambo, 2008-2011).

Floriculture business in Nepal is in an increasing trend and this business was first studied in the late 1980s. Nepal as a tourist destination has good market opportunities for floriculture products. It provides employment and thus income is generated. This industry directly contributes to better living and environment. This business is intensified specially since the early nineties. So far, the floriculture sub-sector in Nepal is thriving without a well-defined policy, strategies and any incentives toward strengthening competitiveness. The Master Plan for Horticulture Development (1991-2010) and the Agricultural Perspective Plan (1995-2015) are silent on floriculture aspects. It was only in the Tenth Five Year Plan (2001-2006) a general priority thrust was given to the development of floriculture, as one of the high value products (FAN, 2010). Enthusiastically, the private sector investment in this sector resulted growth in domestic consumption as well as export. Small and medium sized commercial growers have increased significantly. There were 550 firms in 2005/06 that has increased to above 650 by 2014. The trend of cut flower is expanding in other cities like Pokhara, Narayanghat, Hetauda, Biratnagar, Dharan, Dhangadhi (FAN 2014).

According to FAN, the popular cut flowers are gladiolus, rose, carnation and gerbera. Carnation is the flower that needs to be grown with controlled environment, i.e. needs shed and quite a good attention.

Table 3.1 clearly shows that altogether 650 entrepreneurs/farmers are working with 141 hectare of land across 38 districts of Nepal. In the meantime, around 40,000 persons are directly or indirectly dependent on the floriculture business. Among these, 5,000 are directly employed, 20,000 are dependent on those employed and 15,000 are indirectly employed. Currently, nearly 75 percent demand of cut flower is met

**Table 3.1. Production of Cutflowers in Nepal**

SN	Description	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14
1	Number of Nursery	550	560	600	600	625	635	636	650	650
2	Total land use in hectare	82	87		105	110	120	120	137	141
3	Total land use of Carnation (Ropani)*		25	30	40	40	83	99	107	
4	Number of district	34	35	35	35	35	35	36	38	38
5	Import cut flowers (%)	20	25	25	25	25	20	22	25	
6	Number of showroom (retailers)	58	57	54	60	86	86	86	95	85

Source: FAN 2015

1 Hactare = 19.965 Ropani

from domestic market whereas the rest 25 percent is fulfilled by importing the cut flowers from international market with 90 percent from India mainly for rose and 10 percent from Thailand mainly for orchid. In case of seed, hybrid seed, mother plant, bulbs, roots, Nepal still entirely depends in international market. 70 percent demand for seed and mother plant are met from India, 10 percent from Holland, 10 percent from Spain/Italy and remaining 10 Percent from other countries. However, the exports of recently commercialized floriculture products to these markets are possible with the submission of phythosanitary certificate (PC) issued by the competent authority in Nepal.

Domestic supply of the varieties like gladiolus, roses, carnations, gerbera, orchid, etc. has increased substantially, gradually replacing the import.

### 3.1.2 Carnation

This study focuses on cut-flower 'Carnation' only. Study was more focused on poly house cultivation of Carnation. The *carnation*, scientifically known as *Dianthus caryophyllus*, is a historically rich and meaningful flower choice. With its scientific name *dianthus* roughly translating to "flower of love" or "flower of the gods". One of the world's oldest cultivated flowers, the carnation is appreciated for its ruffled appearance, clove-like scent, and extended blooming period.

In Nepal, Carnation is one of the most popular varieties available in the market. The demand of Carnation in Nepalese market is 5,500-7,500 sticks per day or around 2,500,000 sticks per year. It is estimated that 1,500,000 carnation sticks are produced in Nepal and around 1,000,000 are imported annually. The cut-flowers are being cultivated in thirty-eight districts out of 75 districts in Nepal. The October, November and December being the festival period are the month where the domestic production is not sufficient to meet the local demand and has to be imported. The details of season for demand and production of Cut-flower in Nepal are presented in Table 3.2.

**Table 3.2. Season for Demand and Production of Cutflower in Nepal**

Season	Peak	Slack
<b>Production</b>	April, May, June, January, February, March	July, August, December
<b>Demand</b>	April, May, June, <b>October, November, December,</b> January, February	May, July, August, December

The shelf life of Carnation is 10 to 15 days in winter and 8 to 12 days during summer. The important aspect of the floriculture business is that after harvesting the flower, their shelf life is not too long to restore them until they are sold out. This limits the distribution time of the flower to domestic or foreign market. There is no cold storage as such at grower's level yet in Nepal. According to FAN there is warehouse at community level where all the growers can store their products for certain time beings. The details of shelf life of flower is presented in Table 3.3.

**Table 3.3. Shelf Life of Flowers**

Flowers	During Winter (in days)	During Summer (in days)
Carnation	10 to 15	8 to 12
Gladiolus	10 to 15	8 to 12
Dutch Rose	10 to 15	8 to 12
Local Rose	5 to 10	3 to 5
Gerbera	12 to 18	10 to 12
Tuberose	30 to 45	15 to 25

### 3.1.3 Rationale of Studying Carnation

The floriculture industry is an important sector that has huge potential of the following because of which this study justifies the rationale.

- It is a self-employed industry
- Huge opportunity of employment generation
- Opportunity of using skill, creativity in designing the flower and bouquet
- Retention of young manpower in the country and can decrease the outflow of young manpower
- Poverty alleviation
- Earning foreign currency. It has large potential of exporting the cut-flowers to India, USA and European countries.

There are altogether 79 Clients of Agricultural Development Bank Limited (ADBL) in this industry. These clients have been associated with ADBL for credit and out of 79 clients 25 are within Kathmandu valley. One prominent grower Kumari Flora of Chitlang was selected for the case study. One wholesaler, United Flora from Teku and one trader, Design Flower of Kamaladi in Kathmandu were selected for pertinent information. Also, meeting with the Chairman and the Secretary of Floriculture Association of Nepal (FAN) was held for informal discussion about the issues pertaining to the floriculture industry of the country.

### 3.1.4 The Kumari Flora of Chitlang, Makawanpur

#### *Entrepreneur*

Kumari Flora is one of the leading entrepreneurs in floriculture sector. It started flora business in 2055 BS (1998 AD) thereby using only 2 anna (31.75 m<sup>2</sup>) area of land for nursery in Kathmandu. The main person behind the inception of this business is Mr. Indra Maharjan who used to involve in series of activities before starting floriculture business. He was involved in a mechanical workshop for repairing and maintenance of vehicles and automobiles. But the business couldn't mark success and he then started small cow farming which turn out to be a failure business as well. He then worked in French Embassy as a Driver. As per interaction, Mr. Maharjan infers that since his childhood he is fond of nature and natural inhabitant. He likes gardening very much and he normally plants the flowers in places where ever he finds space for plantation. As per him, one day he bought a nursery flower from NPR 2 which after harvesting he was able to sell in NPR 15. This very moment is a trigger point for his life. He then realized and decided to initiate a small business in this sector and start nursery from 31.75 m<sup>2</sup> of land in Paknajol, Kathmandu. With the help from his two sons: Mr. Rabindra Maharja (Elder) and Prabindra Maharjan (Younger), Mr. Maharjan has fully devoted his time in Nursery business.

The nursery business turns out to be a profitable and the buyers also starts demanding cut flowers. So, he decided to start the cut flower business as well. His elder son Mr. Rabindra Maharja helps him in the production of cut flowers whereas his younger son Mr. Prabindra helps him in marketing of the cut flowers, recording of the book keeping and all financial transaction. He expanded his business in 2 Ropani land (1 Ropani = 508 m<sup>2</sup>) at Chamati (2 KM from Paknajol) with planting cut flowers in bamboo shed. He further expanded his production area to another 3.5 Ropani in the same area. By the time, the expansion of business demand capital for further investment and this has been fulfilled by ADBL. He is associated with ADBL in 2059 BS (2002 AD). The business becomes very lucrative and he has further expanded the business in Chitlang of Makawanpur District where he purchased 8 Ropani of land and also takes 14 Ropanies of land in lease.

### *Family Members*

The total member of family of Mr. Maharjan constitutes nine with his wife, two sons and two daughter in law and three grand children.

Both his sons are now well trainers of cut flowers. Younger son gets training from Netherlands as well as from Thailand especially in the area of Production, Technical Aspect, Marketing of floriculture. FAN is using both of them as LRP (Local Resource Person) for various training programs. Maharjan family is happy with the profession and has initiated their own wholesale floriculture firm under the title "United Flora". Under United Flora they start importing seeds and plants from abroad and distribute to the retailers in one hand and collect cut flowers from growers and sell to the retailers in other hand. They have future plan to expand the business and also desire to focus on commercialization of cut flowers to reinforce the business for export and also planning to construct cold storage for preserving floriculture for a long period of time.

Local communities are much benefitted from his farm by getting opportunity to work, learn and replicate floriculture production in their own farm. They have made a notable contribution for replication of the farm for other entrepreneurs by providing them technical consultancy free of cost. They also provide suggestions for preparation of land till distribution of the products in market besides providing training to them. They are permanently providing employment to 5 local people and also provide temporary employment when and where necessary. In addition, they are buying organic agricultural products of local communities for their farm. Maharjan family is quite happy with the decision of initiating this profession.

### *Impact*

**Assets:** Mr. Maharjan is able to acquire 8 Ropanies of land for cut flowers production in Chitlang, Makawanpur and also possesses one four wheeler jeep and two motor bicycles.

**Human resource:** Mr. Maharjan including his family members is well trained in this business and also providing training to other farmers for land preparation, pruning, weeding other technical aspects.

**Linkages:** Mr. Maharjan has developed international linkages in floriculture sector especially in Netherlands and Thailand. His younger son Mr. Prabindra has organized training program for the floriculture entrepreneurs by inviting resource person from Netherlands. He is also invited in the training program to present a floriculture case study from Nepal in Netherlands.

**Financial status:** He has saving in many financial institutions. He has also increased loan transaction and also establishes himself as very prominent floriculture entrepreneur. His financial credibility among financial institutions is very high as such many banks and financial institutions are requesting for credit and saving

**Social status:** He including his family members are empowered and also well known in society; district and nation as a whole. They receive many rewards during floriculture exhibition in national and international arena. In the meantime, he is also member of FAN.

### **3.1.5 Major Stakeholders in Carnation Value Chain**

The major stakeholders involve carnation value chain are supplier of planting materials/seeds and other inputs, flower production, packaging, transportation, wholesaling, retailing, import and export. However, the broad components of the industry and the links in the input, production and distribution chains are similar throughout the world. This reflects the common requirements of carnation growing and the limited nature of off-farm processing associated with carnation.

## **Input suppliers**

There are mainly three types of input suppliers involved in carnation value chain.

## **Planting materials**

In context of Nepal, growers are mostly dependent on private seed companies who import the seeds from abroad. As per the existing scenario, mother plant of Carnation is being supplied by the following four suppliers in Kathmandu Valley:

- United Flora,
- Floral Nepal,
- Shree Suppliers and
- Oasis Continental.

Most of the growers of carnation are involved as partners. As a matter of fact, Kumari Flora also has stake in the United Flora. These four suppliers import the seeds and distribute as wholesalers of the floriculture business. Most of these suppliers and wholesalers are meeting their need of finance from commercial banks.

## **Agrochemicals and equipment**

The main suppliers of the chemicals as well as equipment and machineries for the cut flowers including carnation are Agricultural Inputs Company Limited (AICL), several agro vets and some of the cooperatives. They supply machinery and equipment such as water pump, sprinkler/drip irrigation system and tractors.

## **Packaging and decoration materials**

Except for the common foliage such as Cycas (*cycas revoluta*), Areca (*areca catechu*), Asparagus, most of the packaging and decorative materials are supplied by stationery shops and hardware shop. For the common foliage, the wholesalers imported from abroad whereas materials for preparing bouquet and decoration including wrapping paper, ribbon, colorful cloths and printed plastics are supplied by stationeries and gift shops. Wire and strings are supplied by hardware.

## **Growers**

Growers of carnation are those who are engaged in the production of flowers of different species with the investment and also having technical knowledge on the flower farming. There were 16 commercial producers of carnation in Nepal. Among them 5 each were in Kathmandu and Bhaktapur, 4 in Dhading and 1 each in Chitwan and Lalitpur. This shows that most of the farming is around the Kathmandu valley and Chitwan.

## *Traders*

## **Wholesaler/Importer**

There are four wholesalers of cut-flower in Kathmandu and one in Lalitpur district. They collect carnation along with other cut flowers from growers at their collection center and make arrangement to keep them properly. Cut flowers thus collected are put on open showcase and allow the buyers to select from among the available stock. While, producers in nearby areas deliver the product to wholesaler's premises, wholesalers make arrangement to collect cut-flower produced at distant places. Among the wholesalers United Flora, Flora Nepal, Shree Suppliers and Oasis Continental also import and export carnation while United Flora and Shree Suppliers import and export carnation depending on market demand. (PACT 2014)

## **Retailers**

Retailers are traders who purchase the cut-flower from wholesalers and sell to end users. Some of the retailers, especially those dealing outside of Kathmandu, also collect cut-flower directly from producers. There are altogether 85 retailers involved in cut-flower business. They are the most important part of the business as they make largest amount of value addition in the cut-flower business by preparing bouquet, arranging flowers as per demand and decorating specific venue/vehicle etc. There are only few suppliers that do retailing of cut-flower without rearranging/packaging.

## **The Enablers**

### *Department of Agriculture*

District Agriculture Development Offices (DADOs) under Department of Agriculture (DoA) are functional in all of the districts. DADOs are at the center of all activities related to agriculture in associated districts. They operate extension services and provides technical training to individual farmers, groups, traders and to cooperatives. At the national level, Directorate of Agribusiness Promotion and Marketing Development, DoA is responsible, among others, for capacity building of various target groups involved in agribusiness and marketing. The Agribusiness Promotion and Marketing Development Directorate of DoA has a broad mandate to establish physical markets, develop market infrastructure, promote agribusiness and develop capacity of various stakeholders. In floriculture, DOA through DADOs is implementing various activities on promotion mainly focusing at the production level. Group 13 formation, technical advice to growers, technology demonstrations, and trainings are some of their activities.

Horticulture Development Directorate (HDD). The objective of this directory is to promote horticulture including floriculture by improving production and productivity, plan for import substitution and export promotion and increasing farmers' income. Collection and selection of varieties, technology generation, production and distribution of quality planting materials, and providing training and technical know-how to the farmers are some of the key activities of this directorate.

### *Flower Development Centre (FDC)*

The Flower Development Centre (FDC), Godawari, established in 2004 at 3.72 ha is specializing on production of flower saplings, seedlings, bulbs, and plants. In the past two years FDC has conducted number of agronomic and post-harvest training programs for farmers. In association with the potential DADOs, the center is involving in the promotion of the floriculture sub-sector in Nepal.

### *Nepal Agricultural Research Council (NARC)*

NARC is responsible for agriculture research in Nepal. Horticulture research division, Kumaltar is mandated for agriculture sectors research. NARC conducts Research and Development activities through its commodity research programs, regional agricultural research stations, agricultural research Stations, and agro-ecological outreach sites located at different parts of Nepal.

### *Project for Agriculture Commercialization and Trade (PACT)*

PACT is a six year project implemented by Government of Nepal, Ministry of Agriculture Development, with the assistance of the World Bank since 2009. The project aims to increase competitiveness of smallholder farmers and the agribusiness sector in selected commodity value chains in Nepal. The project 14 uses a competitive matching grant scheme under which existing agro enterprises, commodity associations, cooperatives, and farmers' groups working actively to expand their business on selected commodities, can submit their investment proposals for project's matching grant.

*Floriculture Association of Nepal (FAN)*

With the objective of promoting floriculture business collectively in Nepal, Floriculture Association of Nepal (FAN) was established on 15<sup>th</sup> November 1992 with the ten founder members. The FAN is an autonomous body working with the objective of developing and supporting floriculture sub-sector in Nepal. It is focusing on capacity building of the floriculture stakeholders through organizing and participating in trade fairs and exhibitions, study tours and observation visits, operation of wholesale outlet, conducting market research and analysis. Development activities of the FAN are focused on technical aspects such as training, trial productions of flower, distribution of mother plant, production analysis, business plan development and feasibility study. The association works for the benefit of this industry's members including from producer to retailer. It has various activities that help in enterprise growth to ultimately establish floriculture as an export oriented industry in Nepal. At present it has 503 members.

*AEC/FNCCI*

FNCCI is an umbrella organization of the Nepalese private sector. It was established in 1965 with the aim of promoting business and Industry while protecting the rights and interests of business and Industrial communities. FNCCI has been playing key role in promoting business and Industry in the Country. The Agro Enterprise Centre (AEC), under the FNCCI, has been the most significant private sector agency providing institutional support for floriculture promotion in Nepal. The AEC initiated its efforts in the floriculture sub-sector by assisting in setting up of FAN in 1992. It extended logistical and secretarial support to FAN during the initial period. It is continually supporting in launching various programs such as organization 15 of trade fairs, trainings, workshops, policy advocacy and lobbying, business plan formulation, etc. The FAN's wholesale outlet and its operation for the successive three years was also a part of AEC support program. The AEC has also encouraged the participation of women in floriculture (WIF), by supporting the establishment and operation of two retail shops, one in Kathmandu and another in Pokhara.

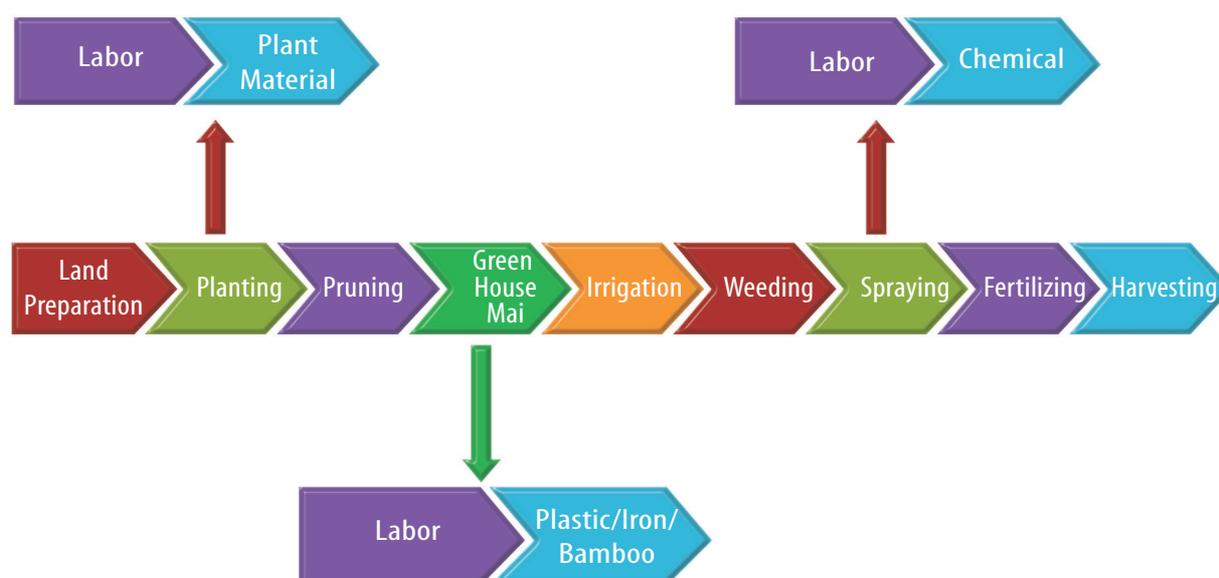
*Financial Institution*

Agricultural Development Bank Limited (ADBL), Nepal was established with the main objective of providing institutional credit for enhancing the production and productivity of the agricultural sector. Besides this the GON has made it mandatory that all of the financial institutions must invest specified percentage of their total lending in agriculture sector. There are several other GOs, I/NGOs and agencies that support production and marketing of cut-flowers in Nepal.

**3.1.6 Production Flow of Carnation**

The diagram (Figure 3.1) below shows the production flow (process) of the carnation. The process includes land preparation, planting, pruning, irrigation, weeding, and spraying and fertilizers treatments. The process includes the maintenance of the shed as well as the staking netting in the shed. All these processes are labor-intensive activities. From the information, it is observed that about 43 percent of total cost is attributed to labor. The materials consumed are the plant materials during planting process, chemicals during fertilizer spraying, plastics, iron for shed construction.

Under Poly technique and drip irrigation system, carnation productivity is comparatively higher than the production under ordinary system. The treatment of 2,000 carnation plants in iron shed with plastic tunnel has yielded nearly 37,000 sticks during first year period which simply gives the average yield of 18.5 sticks per year or 101 sticks per day. During second year period its average productivity is increased by nearly 10 percent which later in the next six months drastically decreased by more than 60 percent.

**Figure 3.1. Floriculture Production Chain**

Source: Kumari Flora, Chitlang, Makawanpur (2014)

For the remaining one and half year period, the average stick per year is 98 which is slightly less than previous year as shown in Table 3.4.

**Table 3.4. Total Production from 2000 carnation plant over the period of 1 to 1½ years of operation**

	Production Year 1	Production Year 2-2.5
Total Production	37,000	53,898
Average stick per day	101	98
Average stick per plant	18.5	18

### 3.1.7 Marketing

Distribution and marketing arrangements significantly depends on the demand and supply of the product. If demand exceeds the supply, import of the product is inevitable and if demand is less than supply, then there is chance of exploration for export of products in other areas.

In case of Nepal, a good domestic market can be seen as an opportunity, particularly when the domestic flower market in Nepal is on the rising trend. Roses, Gladiolus, Carnation and Gerbera are the major flowers that have been continuously emerging as highly demanding products in the domestic market. There are farms that are solely producing nursery stocks, while others produce those in combination with other flowers to cater merely to the domestic market. The details of demand of cut flower in Nepal are presented in Table 3.5.

**Table 3.5. Demand of CutfLOWER in Nepal (Number of Sticks)**

Description	09/10	10/11	11/12	12/13	13/14
Gladiolus demand (sticks/day)	4,000-5,000	4,000-6,000	6,000-8,000	6,000-8,000	6,000-8,000
Rose demand (sticks/day)	4,000-5,000	4,000-6,000	7,000-9,000	7,000-9,000	7,000-9,000
Carnation demand (sticks/day)	3,000-4,000	3,000-5,000	5,500-7,500	5,500-7,500	
Gerbera demand	3,000-4,000	3,000-4,500	5,000-7,000	5,000-7,000	
Tuberose demand (sticks/day)	2,000-3,500	2,000-3,500	4,000-6,000	4,000-6,000	
Orchid demand	200-300	150-300	250-500	1,000-3,000	

Source: Floriculture Association of Nepal (FAN)

### 3.1.8 Domestic Market

Annual domestic market for the cut flower is estimated as NPR 1.3 billion. In an average the domestic market is growing between 10 to 15 percent annually. The data based on AEPC shows that about 20 percent of cut flowers, 60 percent of ornamental flowers and 90 percent of seeds demand are met through import. In case of carnation, the annual demand is estimated between 5,500 to 7,500 stick/per day. Demand of flowers particularly grows during marriage seasons which fall during February, May, June and December and also during festivals like Dashain (October) and Tihar (November). The consumption pattern of the cut flower by the type of clients shows the flourishing business trend and it has been presented in Table 3.6.

**Table 3.6. Market perception of cutflower**

Market Segment	Trend for last 2 years
Wedding ceremonies	Highly increasing
Hotel, travel and tourism industries	Highly increasing
Birth, death and other personal programs	Very good and increasing
Welcome, farewell and similar ceremonies	Very good and increasing
Foreign diplomat missions	Moderately increasing
Office and official functions	Moderately increasing
Special occasion: traditional and religious	Moderately increasing

When average retail price of the cutflower is analyzed for the last two years, no distinct change was found. Price of the cutflower almost remains constant. In such situation, entrepreneurs are expected to benefit by increasing business volume. The market price of cutflower during 2014 and 2015 is presented in Table 3.7.

**Table 3.7. Market price of cutflower**

Cutflower	2014	2015	Cutflowers	2014	2015
Carnation	25	25	Tuberose	15	15
Rose	25	25	Marigold	25-100	25-100
Gladiolus	15	15	Orchid	>200	>200
Gerberas	20-25	20-25	Lilium	>250	>250
Chrysanthemum	15-25	25-40	Anthurium	10-15	10-15

### 3.1.9 Marketing Channel

On the basis of interview of the growers, wholesalers and retailers, the following four channel of marketing system of floriculture products can be observed:

- Channel 1: Grower-Wholesaler-Retailer-Consumer
- Channel 2: Grower-Wholesaler-Consumer
- Channel 3: Grower-Retailer-Consumer
- Channel 4: Importer/Wholesaler-Retailer-Consumer

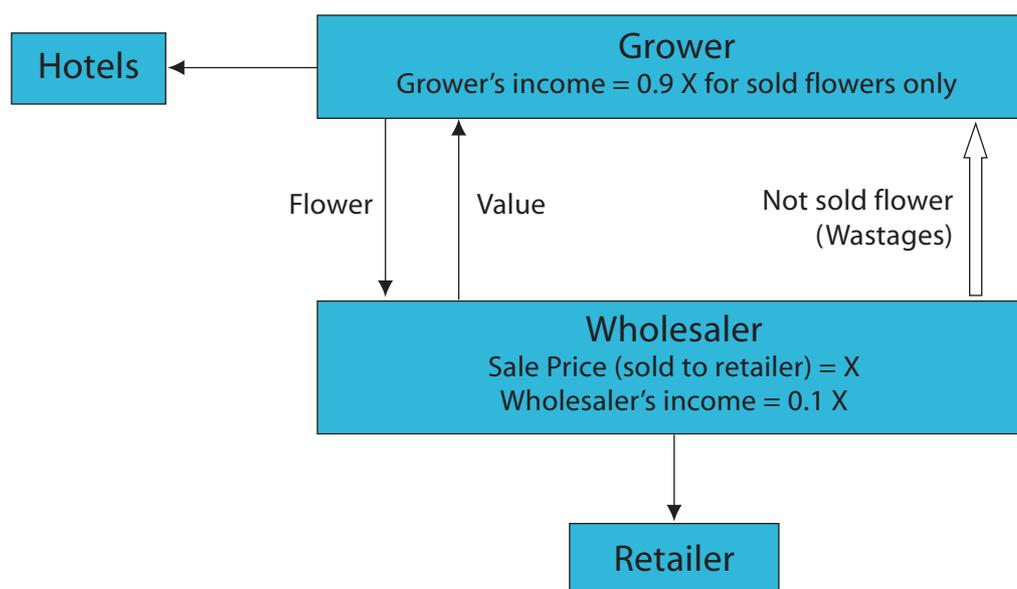
Channel 1 is the most commonly used channel for the domestic production and channel 4 for the specific floriculture products which have to be imported from abroad. Similarly, the practice of channel 2 is observed when consumer needs a large volume of flowers at one time.

### 3.1.10 Pricing of Flower

The pricing is done entirely by the wholesaler only. The wholesaler takes 10 percent of the sale price to the retailer and remaining 90 percent of the price is paid to the growers. The growers also send their products to hotels and other seasonal events directly on their own and they make the pricing decision.

Important aspect is that the wholesaler sends all the flowers back to the respective growers that are not sold. And, all these unsold flowers are the wastages to the growers which are all thrown away. The wastage flowers might be in large quantity if all the 636 grower's wastages are put together. In that case another processing industry for essence oil or perfume could be established to add value to it.

**Table 3.8. Pricing of Carnation**



### 3.1.11 Cost Benefit Analysis of Kumari Flora, Chitlang

### 3.1.12 Fixed Asset Investment

Carnation is a perennial crop which once planted in poly tunnel produce flowers for two and half years. Initial investment cost in this enterprise is not very high as compared to other agricultural enterprises if the entrepreneur owns the land. One can get land on lease and can start the business constructing greenhouse plastic tunnel with iron shed after preparing land. The fixed asset investment for this venture comprises the investment in iron shed, greenhouse plastic, Netting Material and Drip Irrigation facilities. The entire production/cost benefit analysis is computed for one of sheds of 26\*80 Sq Ft area of Chitlang Makwanpur for Carnation where 2000 plants can be planted. Currently, Mr. Maharjan has 7 well-developed-iron shed each with 26\*80 Sq Ft area. So, the fixed cost, variable cost and production cost is calculated for each shed which can be replicated for other shed in the same proportion. The total fixed asset investment tunes around NPR 278 thousand for one shed for the area of 26\*80 Sq Ft for first year. Since the production cycle of carnation cut flower lasts for two and half years, the fixed asset investment, fixed cost, variable cost and ultimately production cost is calculated for the two and half years period.

Out of the total fixed asset investment of NPR 278 thousand, almost 50 percent of the cost is incurred by drip irrigation which is followed by cost involved in iron shed (19 percent), Netting (11 percent), Land lease (10 percent) and greenhouse preparation (6 percent). The detail breakdown of fixed asset investment for carnation is presented in Table 3.9.

**Table 3.9. Fixed Asset Investment**

Items	Cost Per Sq Ft (Rs)	Total Area (Sq Ft)	Cost	Depreciation rate %	Depreciation Year 1	Depreciation Year 2-2.5
Iron Shed construction	25	2,080	52,000	5%	2,600	3,900
Greenhouse Plastic Cover	8	2,080	16,640	20%	3,328	4,992
Netting for carnation production (9 roles with INR 2,200 per role)			31,680	20%	6,336	9,504
Land Lease (14 ropanies with NPR 2,000 per ropani)			28,000	16%	4,480	6,720
Drip Irrigation			140,000	7%	1,400	2,100
Land Preparation			10,000	100%	1,429	1,000
<b>Total</b>			<b>278,320</b>		<b>19,573</b>	<b>28,216</b>

### 3.1.13 Fixed Cost

Fixed cost in this venture comprises of depreciation cost, bank Interest, salary for the labor, transportation cost and machinery and equipment. The fixed cost for the first year is NPR 187 thousand where as for next one and half year it is tuned around NPR 269 thousand. The major component in fixed cost is salary of the labor (36 percent) followed by bank interest (27 percent), transportation cost (18 percent). Same trend of fixed cost is applied for the remaining one and half year as well. The detail of the fixed cost is depicted in Table 3.10. On the way of analyzing the total annual cost of the project, the fixed cost tuned around 65 percent.

**Table 3.10 Fixed Cost**

Items	Unit	Price/unit	Total Cost Year 1	Total Cost (2-2.5) Years
Salary for indirect labor (1 year)	5	8,000	68,571	102,857
Bank interest (@ 10%)			50,000	75,000
Depreciation cost			19,573	28,216
Maintenance of Shed (5% of fixed assets)			1,988	1,411
Telephone/communication			10,000	10,000
Transportation cost (10 trips in one month with 2,000 per trip)			34,286	51,429
Machinery and Equipment			3,500	1,000
<b>Total</b>			<b>187,918</b>	<b>269,913</b>

### 3.1.14 Variable Cost

Variable cost of this project for the first year is NPR 102,200 which stands 35 percent of the annual total cost. In the next one and half year variable cost is significantly lower and it is tuned around NPR 45 thousand. This is due to the harvesting life cycle of carnation which is approximately two and half year. Once the plantation of the carnation is done, it gives the flower sticks for two and half years. As per the data, imported carnation is the major component in the variable cost which stands almost 68 percent followed by fertilizers (18 percent) and Local labor cost (4 percent). Details of variable cost are presented in Table 3.11.

**Table 3.11. Variable Cost**

Items	Volume in stick	Rate/stick	Total Cost Year 1	Total Cost Year 2-2.5
Imported Carnation for one shed with 2,000 plants at NPR 35 per plant	2,000	35	70,000	0
<b>Labor Cost</b>				
Plantation			2,000	3,000
Weeding/Pruning/Spraying/(lump Sum)			2,000	3,000
<b>Fertilizer</b>				
Local/Organic Fertilizer			5,000	7,500
Chemical Fertilizer			10,800	16,200
Pesticides			2,400	3,600
Others			10,000	12,000
<b>Total Variable Cost</b>			<b>102,200</b>	<b>45,300</b>
<b>Total annual operating cost</b>			<b>290,118</b>	<b>315,213</b>

### 3.1.15 Profit Margin

The average net profit of carnation in year 1 is NPR 69 thousand. During this period, the cost of production of per stick is NPR 7.84 and its sales price per stick after deducting the commission to wholesaler is NPR 10.8. This shows that net profit per stick for the grower is NPR 2.96. This profit is 38 percent of the cost and 27 percent of the sales price.

The production of carnation increases during the second year but its production and quality drastically deteriorate in the remaining six month period. The net profit for the year and half period is NPR 92,256. The cost of production of per stick during that period is NPR 5.85 due to less amount of expenses in variable cost. Its sales price per stick after deducting the commission to wholesaler is NPR 10.8. This shows that net profit per stick for the grower is NPR 4.95. This profit is 85 percent of the cost and 46 percent of the sales price. The details of the profit margin are presented in Table 3.12.

**Table 3.12. Cost and Return from 26\*80 Sq Ft of Carnation Flower**

Description	Shed Area 26*80 Sq Ft using 2,000 plants	Carnation	
		Year 1	Year 2-2.5
	<b>Unit</b>		
Fixed Cost	NPR/Shed	187,918	269,913
Variable Cost	NPR/Shed	102,200	45,300
Total Annual Cost	NPR/Shed	290,118	315,213
Total Annual Income with 10% loss (production 37,000 sticks in year 1 per shed – 0.10*37,000 = 33,300 @ NPR 12/Stick) – 10% Commission to Wholesaler	NPR/Shed	359,640	407,469
Net Profit	NPR/Shed	69,522	92,256
Cost Per Stick		7.84	5.85
Sales Price Per Stick		10.8	10.8
Net Profit Per Stick		2.96	4.95
Profit as % of Cost		38	85
Profit as % of Sales		27	46

### 3.1.16 Value addition

From the analysis it has been observed that the major actors in the value chain are the growers, the processors, the wholesalers and the retailers. Customers of the flowers are another important actor. Most important actor is the government and other related authorities who support the whole chain by their presence and providing services where needed. Floriculture association of Nepal (FAN) has another important role in protecting the right of all the growers, wholesalers and retailers in the business.

The value can be added by the growers at the stage of selection of quality seeds, taking good care of land, fertilizers, irrigation, staking and all other activities. More care is done, more productivity and good quality products are expected, hence, addition of values takes place. The growers need training at each stage of the production process where the concerned government authority should take the lead.

In this regard, the shed preparation and drip irrigation system need large investment to the growers where they might need institutional support for proper finance. The easy accessibility and subsidy in loan might be a great help to them.

Best storage of the flowers and the best mode of transportation of the product to the wholesalers and to the business market increase the value of the product. It has been observed from the study that the mode of transport being used by the grower is truck, bus and motorcycle. The transportation mode of retailer is found to be motor cycle and even bicycle. In foreign countries, the transportation medium such as trucks and other vehicles are air-conditioned; there is cold storage in airport so that the quality of flowers remains intact until its consumption time.

The value addition starts from producers and continues until it reaches to consumers. Cost of production of carnation is NPR 7.84 per stick. Grading, packaging and transportation costs up to wholesale premises are another NPR 1.0 and handling loss equivalent to NPR 0.20 per stick. Thus total cost of production of carnation for producer is NPR 9.04 average price the growers received from wholesalers is NPR 12 per stick indicating a margin of NPR 2.96 per stick to producer.

Wholesale provide limited but very important service of providing linkage with the market. Cost wise, wholesaler provide storage cum showcase which cost NPR 0.4 per stick. And their net benefit is NPR 2.6 per stick.

The major and visible value addition in carnation is made by retailers. They convert simple carnation sticks into beautiful bouquet, arrange them into impressive way and decorate venue especially in party palace during special occasion as wedding/festival and also decorate vehicle as required. They use several materials including foliage, ribbon, plastic, wire/string and cloths. Wage and train labor is also important component of cost as carnation need careful handling at all stages in value chain. Retailers buying price from wholesalers is NPR 15/stick. Grading, packaging, transportation, storage and losses add another NPR 4.6/stick resulting the total cost 19.6/stick. They sell at the rate of NPR 25/stick taking profit of NPR 5.40/stick from the customer. The details of the value addition for carnation are presented in Table 3.13.

During the study, it was also observed that the preservation of flowers in the flower shop is purely traditional and simple, without cold system and other training. The flower-shop is the platform where there is large scope of creativity of designing of the bouquet and many more. Also, lots of unsold flowers go wastage due to their short life in normal conditions. Therefore, the retailers have high opportunity of adding value to the product. Hence, it is believed that the waste flowers from retailer shop and the growers could together create another business of making essence oil and perfumes.

**Table 3.13. Value Addition Table for Carnation**

Description	Producers	Wholesalers	Retailers	Total
Cost of Production	7.84			7.84
Buying Price		12	15.0	
Grading Packaging	0.5		2.0	2.5
Transportation	0.5		0.2	0.7
Storage		0.4	0.8	1.2
Losses	0.2		1.6	1.8
Total Cost	9.04	12.4	19.6	
Sales Price	10.8	15.0	25.0	
Profit	2.96	2.6	5.40	10.96
Profit as % of Cost	33%	22%	28%	
Profit as % of Sales Price	25%	17%	22%	
Share in total benefit	27%	24%	49%	100%

**Table 3.14. SWOT Analysis**

Strength	Weakness
<ul style="list-style-type: none"> <li>• Growing market, flower-loving people</li> <li>• Demand is high in domestic as well as international market</li> <li>• Favorable climate for flower production in Nepal</li> <li>• Emerging institutional capacity building</li> <li>• Realization of the need for cooperative actions</li> <li>• Collaborative culture in the Supply Chain</li> <li>• Higher degree of trustful relations among actors in the supply chain</li> </ul>	<ul style="list-style-type: none"> <li>• Post-harvest life of flower is very low/lack of cold storage</li> <li>• No uniformity in quality of production</li> <li>• Small industry scale that doesn't allow narrow specialization</li> <li>• Poor knowledge and low professionalism in the industry</li> <li>• Lack of cooperation among the industry actors</li> <li>• Low production efficiency</li> <li>• Scientific and market research is lacking as a result weaker capabilities in the global floriculture industry value chain</li> <li>• No collective strength of growers</li> </ul>
Opportunity	Threat
<ul style="list-style-type: none"> <li>• High demand in domestic as well as international market</li> <li>• Employment opportunity (for women too)</li> <li>• Developing the industry through higher collaboration, collective learning and building up sustainable relations (multinational companies), foreign direct investments</li> <li>• Export Potential not yet exploited</li> <li>• Essential oil, perfumes from cut flower (rose, tube rose, marigold) from the waste flowers</li> </ul>	<ul style="list-style-type: none"> <li>• Unstable business, political and institutional environment</li> <li>• Government policy to protect and flourish the industry (infrastructure, tax exemption, subsidy: interest, cold storage, air freight)</li> <li>• Demand fluctuations</li> <li>• Unstable prices in the market</li> <li>• Changing consumer preferences</li> <li>• Poor infrastructure (road, electricity, irrigation, institutional credit)</li> <li>• Legislative and economic uncertainties</li> <li>• Plants business requires big financial investments and bears big material risks due to the product perishability</li> </ul>

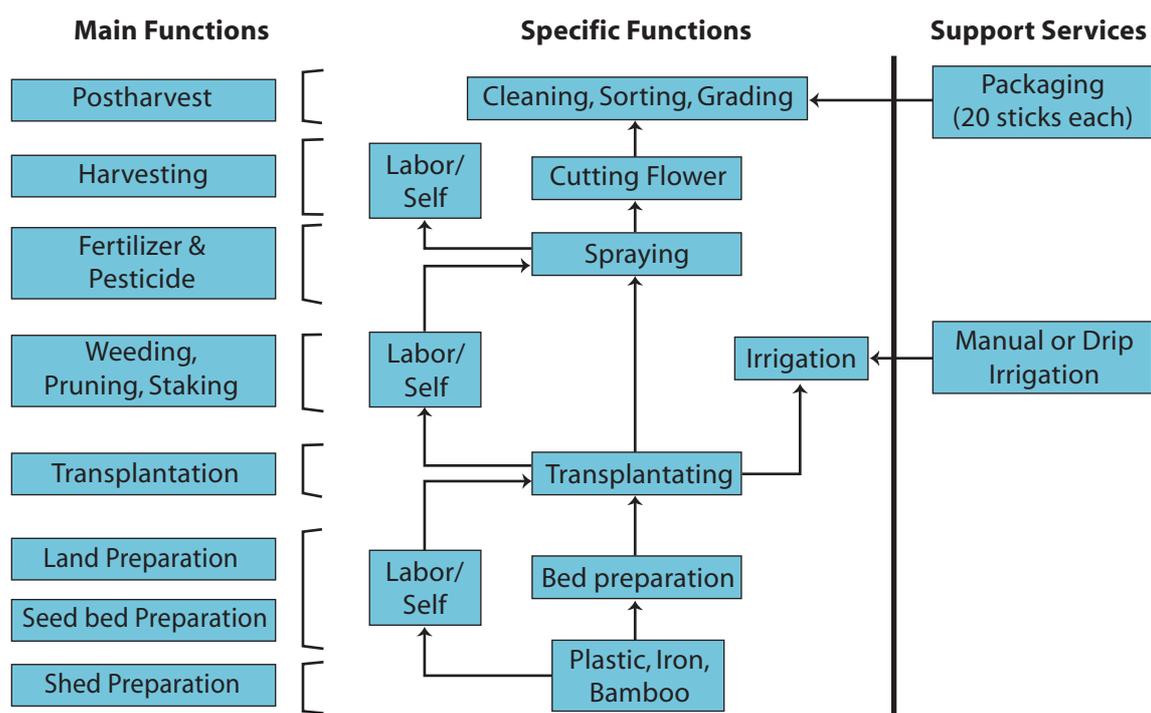
**Table 3.15. Action Strategy**

Action Strategy	Concerned Authority
<b>Training to grower</b> Land preparation, weeding, pruning Applying fertilizer, pesticides Spraying Preparing local quality seeds Harvesting	Ministry of Agriculture and Cooperatives Ministry of Industry Quality Assurance and Certification Floriculture Association of Nepal
<b>Subsidy</b> Irrigation Cold storage Transportation Tax exemption Interest rate on loan Air freight differentiation	Ministry of Finance Ministry of Irrigation and Water Supply Department of Civil Aviation
<b>Export Promotion</b> Quality Assurance and Certification	Ministry of Industry Trade Promotion and Export Center
<b>New Entrepreneurs</b>	Floriculture Association of Nepal

**3.1.17 Production Chain Map**

The value chain map below depicts all the main and specific functions in the production process until the distribution of the product. The main function include the activities starting from land preparation, shed of iron preparation. The propagation of plants, seed preparation is done for germination. The rate of germination is about 80 percent if it is done by trained persons; otherwise the germination rate is as low as 50 to 60 percent.

**Figure 3.2. Production Chain Map**



Source: Survey of the Study (2014-2015)

Plantation is followed by irrigation. The irrigation system being adopted in Chitlang is drip-irrigation, the technology that needs pipes fitted into the ground in such a way that the water is dropped in each and every root of the plants drop by drop. This technology saves time relative to manual irrigation and is highly efficient. The activities weeding, pruning, staking is done for each plant to remain straight.

The fertilizer and pesticide treatments are necessary for high productivity. Domestic as well as chemical fertilizers are used for the purpose. The liquid items are sprayed that also need a good trained hand.

Harvesting and post-harvesting activities are usually done by trained labor or the owner themselves. After harvesting, the flowers are cleaned, sorting of good and defective flowers and then graded as per the quality of the flowers. Some of the quality specifications are the straightness of the stem, color of the flower, good petals and others. The flowers are graded according to these specifications and are packed as the bunch of 20 sticks each.

### **3.1.18 Value Chain Map**

The value chain map clearly presents the primary and supporting activities in the whole floriculture industry. The inbound logistics include the seed, fertilizer and pesticides required for the cultivation and prevention of the crop. The operations include plantation, spraying, irrigation, weeding, pruning and staking of the plants. It also includes harvesting of the flowers that adds the value to the product. The outbound logistics include transportation of flowers to the next destination. The large scale growers distribute their products to the hotels and other events, wholesaler and on exhibition wherever applicable. The small growers transport to the wholesaler and the exhibitions. The distribution to the destination is done by the growers at their own cost.

The market and sales activities include the distribution of flowers to the retailers, the flower shops for sale. The final service occurs when the flowers reach to the customers.

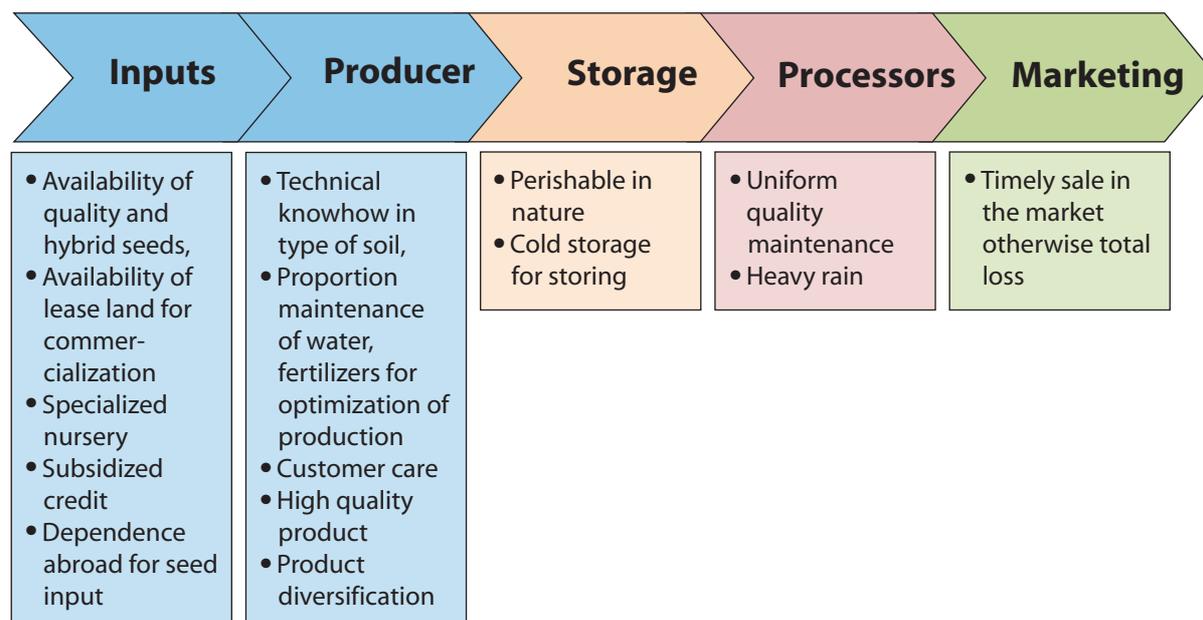
The support activities constitute of major services from the farm infrastructure, whether iron shed or bamboo shed construction. The carnation must be grown into the greenhouse, it needs huge investment, hence, institutional and financial service is required by the growers. The human resource management service support is important because the industry is highly labor intensive, therefore good recruitment policy and training and development is inevitable. More trained and skilled manpower is prepared productivity will be high. The technology services are necessary in this industry and growers expect them from government and related agencies.

### **3.1.19 Finance to Value Chain and Value Addition**

The value can be added by the growers at the stage of selection of quality seeds, taking good care of land, fertilizers, irrigation, staking and all other activities. More care is done, more productivity and good quality products are expected, hence, addition of values takes place. The growers need training at each stage of the production process where the concerned government authority should take the lead.

In this regard, the shed preparation and drip irrigation system need large investment to the growers where they might need institutional support for proper finance. The easy accessibility and subsidy in loan might be a great help to them.

Best storage of the flowers and the best mode of transportation of the product to the wholesalers and to the business market increase the value of the product. It has been observed from the study that the mode of transport being used by the grower is truck, bus and motorcycle. The transportation mode of retailer is found to be motor cycle and even bicycle. In foreign countries, the transportation medium such as trucks and other vehicles are air-conditioned, there is cold storage in airport so that the quality of flowers remain intact until its consumption time.

**Figure 3.3. Risks along the Carnation Value Chain**

### 3.1.20 Future Plan

#### Commercialization in production

Mr. Maharjan has intention to further expand the business and add more land for commercial production. He perceives expansion of business is a very good opportunity considering the increasing trend of demand of carnation in the market. He further adds that the microclimatic conditions of terai and hills are suitable for expansion of business. He has also mentioned to use improved/hybrid planting material and also makes necessary improvement in management practices.

His future plan in some way has been addressed by government by providing 4 percent subsidy to the farmers who start the business for commercialization in agricultural business.

#### Constructing Cold storage

Mr. Maharjan has also planned to construct small size cold storage to store the flowers and reinforce value addition in cut flower business. This endeavor will help to reduce the post harvest losses in carnation as well as other cut flowers. It is estimated that total losses of cut flower after post harvesting tune in the range from 20 percent to as high as 40 percent. The construction of cold storage is capital intensive task as such the commercial bank should provide credit facility to him.

#### Export in International Market

Considering the high demand of carnation and other cut flowers in international market, Mr. Mararjan also intend to export in middle East, Japan and European countries. As per the conversation, he receives the order quantity of 20,000 sticks per day to export in gulf country. But, he couldn't make continuity of this opportunity due to large quantity and uniformity in production quality. He further insists that the export quantity has been accepted in the international arena but it requires professionalism in areas of productions, packaging as well as in quality maintenance. Hence, he continuously advocates for the support from government and stakeholders in training, post harvest handling practices, provision of appropriate store houses.

### 3.1.21 Possible areas of intervention

Past experience of cut flower production and trade in Nepal shows that this sub-sector requires multi-dimensional development plan to harness the potentials. Following are some of the major programs that will yield desirable results.

#### Research and development

A well-equipped research center need to be established with major research thrust on identification/development of local and exotic varieties suitable for different altitude, aspects and soil types. Appropriate method for diseases and pest control is urgently required. Research is also required on most suitable varieties that can yield throughout the year and quality production in term of size and keeping quality. Besides technical research, marketing research is equally important especially for export market.

#### Infrastructure development

Lack of appropriate storage facility compels the producers to sell cut flowers and other floriculture products immediately after harvest. Lack of road infrastructure in remote inner parts of rural area has also made it almost impossible and very expensive to produce and transport fresh flowers to road head. The government needs to provide conducive environment to attract investment in those sectors. Special privilege should be provided to transport company who develop vehicle body appropriately to transport floriculture products.

#### Supply of quality inputs

In the absence of research and development in the country most of the planting materials are imported, mainly from European countries and India. This implies high cost of inputs. Stakeholders also reported that they have to go through lengthy process for payment in foreign currency. These and some of the other major intervention areas for the improvement of floriculture value chain.

## 3.2 Rainbow Trout Value Chain Finance

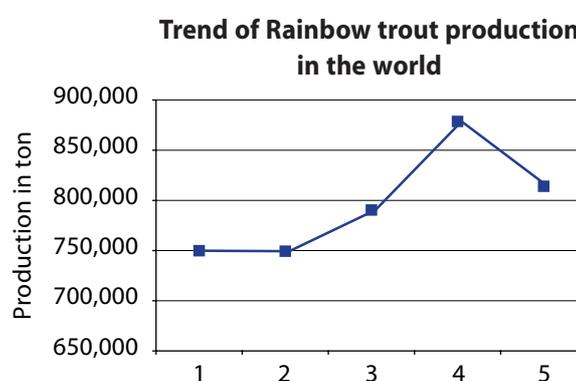
### 3.2.1 Overview of Trout

#### Worldwide production Trend

The rainbow trout farming industry has been developing for several hundred years and many aspects are highly efficient using well-established systems. World wise production trend of rainbow trout is shown in Table 3.16.

**Table 3.16. World Production of Trout**

FY	Production (ton)
2013	814,068
2012	878,702
2011	790,418
2010	749,368
2009	749,837



Source: FAO aqua statistics (wiki)

### 3.2.2 Trout in Nepal

Approximately 5 percent of the total area of Nepal is in the forms of river, stream, lake, reservoir, pond and swamp. Among these, the rivers represent about 49 percent of the total water area. Cool and cold water streams and rivers in Nepal extending from the Himalayas offer excellent habitat to 76 native and a few exotic cold water species, including rainbow trout (Swar, 2008).

In Nepal, modern aquaculture practices initiated from last 50 years and have been gradually increasing in the country. Total fish production has reached to 56,000 MT in 2011/12 out of which 34,500 MT (62 percent) was from aquaculture practices. This sector employs about 0.75 million or nearly 3 percent of the country's population (Gurung, et al., 2013). This is very important as most of the employees in fishery sector come from poor families.

Rainbow trout fish was introduced in Nepal for the first time in late 1960s and early 1970s from UK, Japan and India. However, it was not succeed, mainly due to the lack of technical expertise. It was reintroduced in 1988 from Japan. Nepal Agricultural Research Council (NARC) is continuously involved in developing appropriate breed and its culture technology (Swar, 2008).

Among the different species of fish being cultured in Nepal, rainbow trout (*Oncorhynchus mykiss*) has been attracting the fish farmers and consumers because of its technical feasibility, financial viability, social acceptability, medicinal value and taste. Its popularity grew gradually and has spread over several hill districts of Nepal including Nuwakot, Rasuwa, Kathmandu, Lalitpur, Dolakha, Sindhupalchok, Kavrepalanchok, Makwanpur, Dhading, Kaski and Mustang.

The rainbow trout is one of the unique carnivorous fish which can survive only in well oxygenated cold running water. Water temperature between 14-20 degree centigrade is most suitable for table fish production and 9-13 degree centigrade for fry production.

Rainbow trout reaches commercial size (200-300 gm) within 12-14 months. Weight gain in 2<sup>nd</sup> year is very good as it reaches up to 1,000 gm within 24 months. Trout of weight within 200 to 300 gm is highly preferred by customers. The growth of fish depends upon quality of feed, adequate supply of quality water including suitable temperature and dissolved oxygen concentration, fry quality and appropriate management. In nature, it feeds on aquatic insects, small crustaceans and small fish. It can be cultured using artificial feed of not less than 20 percent of animal protein. Trout is highly nutritious and tasty food enriched with "omega-3" fatty acid which is very good for health. It has no intra-muscular 'Y' bones making it easy and safe to eat. Trend of rainbow trout production in Nepal is presented in Table 3.17.

### 3.2.3 Major Stakeholders

Rainbow trout is comparatively new enterprise and it is centered in few specific pockets areas that are technically suitable, close to road corridor for ease in trading both inputs and outputs. Its trade is concentrated to his own project, Kathmandu and Trishuli. About 92 percent trout is traded as processed at his own restaurant and remaining 8 percent is traded to the customers and hotels of Kathmandu & Trishuli and department store of Kathmandu.

#### Input Suppliers

As value chain of rainbow trout is very small, there are very limited stakeholders that supply inputs. Main inputs are fry/fingerlings and feed. Thus breeder/hatchery and feed producers are the most important among them. Here, the owner Mr. Padam Rumba has constructed own hatchery farm at Rasuwa district with the technical support of NARC/Fishery research center and supplies fry/fingerlings to his own projects and to other producers of Rasuwa and Nuwakot districts. He also manufactures essential feed in his own project site.

**Table 3.17. Trend of Rainbow Trout (table fish) Production in Nepal**

Year	Raceways area (Sq Meter)	Stocked fry (No.)	Production (MT)
1997/98	10	500	0.045
1998/99	20	1,000	0.08
1999/00	6	4,500	0.7
2000/01	280	11,200	1.0527
2001/02	546.3	41,000	5.965
2002/03	1,055.5	79,200	16.192
2003/04	1,075.5	80,900	14.199
2004/05	1,317	99,000	16.095
2005/06	1,571.93	118,000	18.23
2006/07	2,265.27	170,000	25.882
2007/08	7,081.42	354,100	55.192
2008/09	9,128	556,500	82.78247
2009/10	10,800	485,900	88.589
2010/11	12,230	917,250	135.7
2011/12	12,360.6	871,045	159.395
2012/13	10,000		180
2013/14	12,000		192

Source: Nepal Agriculture Statistics year book 2014

Dry shrimp is one of the most vital feed ingredients, which is not produced in Nepal as it is found in sea. Traders of India supply it directly as well as through traders of Kathmandu. Failure of supply of quality shrimp may cause disaster in this industry.

Other feed ingredients are found in local markets as well in Kathmandu. Other inputs like, construction materials, pipes, polythene sheets, nets etc. are bought from local shops. Plastics, pipes, weighing balance, small utensils etc. are supplied by local hardware stores, whereas specific materials such as nets, hapas, graders are available in Kathmandu and Trishuli markets.

#### Primary Traders

There are negligible numbers of intermediaries engaged in trading of rainbow trout according to him. Farm gate is the main place of trading for both processed smoked and live fish. There is high risk of quality deterioration of fish during transport and storage. Glucose water with additional oxygen is essential during transportation. Producers transport oxygenated live fish to his farm and buyer hotel transport oxygenated fish from his farm. Thus, trading between producers/traders is involved, when both parties assure volume, rate, risks and other conditions. There are few intermediaries involved in supply of feed and fingerlings. However, he himself produces fingerlings and prepares feed on own farm. Few wholesalers are engaged in trading of dry fish especially shrimp from Calcutta and Bangkok for feed preparation.

#### Retailers

There is no or very limited retailers in this business according to him. He sales all fish from his own project site. On top of his own production, he trades about 1,000 kg from trout farmers of other districts i.e. Pokhara and Sindhupalchowk. Thus he is doing fry production, rainbow trout production, inputs production and supply, restaurant operation, trading both retail and wholesale.

## Restaurant

There are many trout restaurants on the road corridor of Kathmandu to Trishuli highway. This is the main place of processing as well as trading of trout. Main trout products are trout fry, curry, boil and smoked.

These restaurants are the bulk buyers of trout fish. They buy fish directly from farmers as well as primary traders and wholesalers. Restaurants nearby the production site normally have agreement with producer that supply mutually agreed quantity at agreed price, while restaurants in major towns receive the product through wholesalers. Some of the farms have been running their own restaurants where rainbow trout fish together other food/drink items are served as in case of our producer Mr. Padam. Inclusion of restaurant with fish production is one of the main components of value addition. Total annual consumption of trout in his own restaurant is 90 percent of his own production and 100 percent of the traded 1,000 kg trout. Thus he sells  $4,050 + 1,000 = 5,050$  (92 percent) kg of cooked trout annually.

### 3.2.4 Enablers

#### Department of Agriculture

The Department of Agriculture (DoA) is a public extension organization and it is supporting in public extension services, including dissemination of technology, information, and training for increasing agricultural production, income generation and sustainability programs. Extension activities get technical supports from Nepal Agricultural Research Council (NARC) and also from regional and national level programs. District Agricultural Development Offices (DADO) have collaboration with public, private and nongovernment organizations. The district level extension programs are supervised, monitored and evaluated at regional level by the Regional Agriculture Directorate (RAD) and at national level by the DoA.

#### Fisheries Development Directorate

The Fisheries Development Directorate (FDD) plays a key role in policy formulation, regulation and facilitation for fisheries development in Nepal. National Inland Fisheries and Aquaculture Development Program (NIFAND) and Central Fish Laboratory (CFL) located within the directorate at Balaju (near Kathmandu city) are responsible to promote fish including rainbow trout for pilot initiatives and execution, database management and feasibility assessment, monitoring and coordination.

#### Nepal Agricultural Research Council (NARC)

Fisheries Research Division (FRD) of NARC is established to enhance research, capacity, linkage and partnership in fisheries. FRD is conducting participatory research on rainbow trout. NARC has established Rainbow Trout Genetic Resource Center (RTGRC) at Dhunche of Rasuwa district. Rainbow trout producers are getting support from these research centers.

#### Japan International Cooperation Agency (JICA)

Trout is introduced in Nepal by the Japan International Cooperation Agency (JICA). JICA has assisted for the development of trout in Nepal. Fisheries Research Division, Godawari and Fisheries Research Center Trishuli received support from JICA for scaling up of trout farming, during 2006/07. The main objective of this support was to enhance the trout production in Nepal especially from Rasuwa and Nuwakot districts through community participation.

Under this project various stakeholders associated with trout farming were trained for better technological, managerial, and marketing aspects. Part of the fund of the JICA project was also used to supply hatchery tool/equipment/technologies to farmers, conduct demonstration program, prepare training materials and also encourage women participation in trout farming.

## One Village One Product (OVOP) Program

One Village One Product (OVOP) is a special program replicated from Thailand. It is designed to enhance the capacity of different stakeholders by focusing on market led production of single product that has a comparative edge there. Specifically, the commodity should be special in terms of technical feasibility, financial viability, commercially acceptable, socially acceptable, environmentally friendly and socially well acceptable. It is a Public Private Partnership (PPP) based program officially launched in July 17, 2006 for 5 years as a pilot project. The program implementation part is divided into production and marketing sectors. Federation of Nepalese Chambers of Commerce and Industry (FNCCI) as a private sector takes care of market promotion activities whereas the government sector looks after production side.

Rasuwa and Nuwakot Districts are prioritized as rainbow trout growing districts under OVOP. The products have specific natural taste being produced in the Himalayan cold water and can be competitive in international market as "Himalayan Trout". Farmers/producers/entrepreneurs are encouraged for construction of raceways at technically feasible place on both side of the Kathmandu-Trishuli Highway. It is mainly to grasp the potentiality and to provide easy accessibility to customers and other concerned stakeholders.

Recognizing the role of the FNCCI in the promotion of agribusiness in Nepal and its capacity to play a facilitative/coordination role, the secretariat for the OVOP program is entrusted to the Agro Enterprise Centre (AEC) the technical wing of the FNCCI. The Secretariat is solely responsible for the implementation and monitoring and evaluation of the whole program.

The following organizations are the members for planning the annual program, policy designing and decision making for promotion of rainbow trout under OVOP.

- Local farmers and companies
- Local chamber of commerce and industry
- Local District Development Committee
- Directorate of Fisheries Development, DoA, MoAD
- Fisheries Research Division, NARC
- Fisheries Research Station, Trishuli
- Agro Enterprise Centre, FNCCI
- National Planning Commission
- Ministry of Industry Commerce and Suppliers
- Nepal Rastra Bank (Central Bank of Nepal)
- Ministry of Finance

### 3.2.5 Production and Marketing

Trout farming is knowledge, input and technology intensive farming. It requires year round dependable source of cold oxygenated unpolluted fresh running water with temperature range of 9-13 °C for spawning and 14-20 °C for table fish production.

Mr. Padam Rumba started rainbow trout production since 2000 and is known as the 2<sup>nd</sup> youngest trout producer of Nepal. He got full encouragement from the 1<sup>st</sup> producer Mr. Gopal Lama and government officials.

#### Trout Production Cycle

Fry/fingerlings production, construction of water supply canal, assurance of supply of quality running water year round, construction as well as maintenance of raceways; watering, fry in the raceways, grinded liver of buffalo and poultry mixed with highly protein content feed, feed management, frequent

monitoring, supervision, cleaning of dead fish, monitoring of water supply canals/water quality for oxygen content, measuring body weight, business planning, marketing, trading of inputs/trout, coordination collaboration with concerned stakeholders are the main activities under trout production cycle.

### Market channels and marketing practices

Demand of Trout is more than supply. Nuwakot is special known as trout producing district of Nepal. Trout producing farm of Nuwakot is the 1<sup>st</sup> choice of "trout fish lover customers of Kathmandu especially on weekend and holidays. Thus chain between producer and customers is very short or the shortest chain as compared to other agricultural commodities. As per the opinion and records of the Himalayan Rainbow trout around "90 to 95" of total production and traded live trout is marketing from farm gate. His farm is very popular among fish customers. It is mainly due to special taste of smoked trout with other organic food and the 2<sup>nd</sup> trout producer of Nepal. He has own short shaft water turbine for grinding of maize, millet, wheat and other grains. Local dish made from flour of maize and millet grinded from water turbine has special taste with gravy trout according to him. Local communities are also benefited by producing and getting good return from his organic agricultural products i.e. local chicken, leafy vegetable, trout, onion, garlic, potato, fruits, cereal, pulse and other grains. Return from liquor, other food items and homestay is very attractive.

Weekend of winter especially October to April is like festival for them. About 7-8 groups of young people (especially from Kathmandu) visit his project for cooked trout in these weekends. About three fourth (77 percent) of fish is sold on weekend. Almost all (90 percent) is smoked fish. Annual fish production from his own raceways is 4,500 kg. Moreover, to meet the demand of customers, he trades about 1,000 kg live trout fish per year. Demand is still unmet and increasing, but he is unable to manage with his present capacity. Assumption of trout sale is presented in Table 3.18.

**Table 3.18. Assumption of sale on weekend and general days**

Average trout consumption	Average fish consumption per day in kg	Average days per year	Total consumption	%	Night stay %	Consumption of other food	Consumption of liquor
Weekend (Friday, Saturday and Sunday)	33	125	4,125	76.6	10%	100%	75%
Other days	6	210	1,260	23.4			
			5,385				

Note: About 30 days is considered as road blocked/strike/bandh

Main market actors (for his farm) are as follows:

- Producer
- Inputs traders:
  - Kathmandu, Trishuli, Ranipauwa
  - Indian traders of shrimp
- Regular prime customer
- Customers from Kathmandu
- Visitors/tourists
- Collectors/producers of Pokhara and Sindhupalchowk
- 5 star hotel from Kathmandu like Soaltee
- Department store from Kathmandu like Bhat Bhateni
- Many restaurants on the Kathmandu-Trishuli road corridor

Rainbow trout has a specific niche market that is medium to high income domestic consumers and tourists. Trout is found year round in his farm; however main marketing season is from October to June. Demand is very high during winter season. Rainy season is weak season for marketing. Figures 3.4 and 3.5 clearly show the production cycle of trout and its demand. New raceway is generally constructed in winter, hatching is also done in winter and fingerlings are left in raceways from Mid-January to February.

**Figure 3.4. Rainbow trout production cycle**

Activity	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Hatchery pond preparation												
Hatching and fry management												
Construction/ maintenance of raceways												
Water supply canal construction and maintenance												
Fry/fingerlings in raceways												
Fingerlings in main raceways												
Grinded liver mixed with highly proteinous feed												
Feed management												
Running cold water management												
Monitoring and supervision												
Weight in GM			20	40	70	110	140	170	200	220	260	275
Marketing in 1 <sup>st</sup> year												
Marketing in 2 <sup>nd</sup> year												

Note: Based on discussion with producer

**Figure 3.5. Production and demand**

Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Production	H	H	H	M	M	L	L	L	M	M	H	H
Demand	H	H	H	H	M	L	L	M	H	H	H	H

Smoked price per kg is Rs 1,300, L = Low, M = Medium and H = High

Months: 1 = January, 2 = Feb. 6 = June, 12+ Dec

### 3.2.6 Income and expense analysis

Return from rainbow trout farming is very attractive. Mr. Padam Rumba starts marketing just from 5 months depending on body weight and demand. Optimum size for marketing is 225 gm though he starts selling from 110 to 130 gm according to him. Rainbow trout is marketable throughout year if fingerlings, feed, water quality is managed efficiently. Break Even Point (BEP) of his project is about 23 percent and Benefit Cost Ratio (BCR) is 1.8. These both financial indicators vividly shows the fact that it is financially highly viable though it depends upon both unstable nature and political instability (frequent bandh/strike) of Nepal.

Initial investment cost in this enterprise is higher as compared to other agricultural enterprises. Large amount is needed for construction of raceways, water canal and installation of feed machine. Moreover, other investment includes investment for 24 hour quality running cold water supply system, store house; procurement of nets, grader, fridge and other related equipment.

He has invested NPR 4.258 million for capital investment mainly for raceways construction, water supply canal, stores and feed machine. Table 3.19 above clearly shows the items with cost.

**Table 3.19. Investment in fixed assets**

Items	Cost Rs	%
Raceway	3,310,000	78
Water canal	450,000	11
Stores	350,000	8
Feed machine	100,000	2
Others	48,000	1
<b>Total</b>	<b>4,258,000</b>	<b>100%</b>

### 3.2.7 Banking facility

He is continuing in touch with Agricultural Development Bank of Nepal since the beginning. His present loan outstanding is NPR 3.4 million, started from NPR 0.15 million. He is one of the prime customers of the bank and has been maintaining prime customer i.e. known as green card from the beginning. Annual fixed cost of his project is NPR 913,900. Main components are depreciation (fixed assets like raceways, machinery and equipment's having life more than 1 year), maintenance, interest of bank loan and salary of 2 indirect labors. Breakdown of fixed assets investment is in Table 3.20, annual fixed cost is presented in Table 3.21 the bank loan is NPR 3.4 million.

**Table 3.20. Fixed assets investment**

Items	Cost	Depreciation %
Raceway construction	3,310,000	5%
Water supply system/pipes/canals	450,000	10%
Stores/Workshop	350,000	5%
Dagnet (5 m)	5,000	25%
Netlons/grades/cages/happas	18,000	25%
Small pumps/equipment/balance	15,000	25%
Others (bucket, soft wood etc.)	10,000	25%
Feed machine/defreeze	100,000	10%
<b>Total</b>	<b>4,258,000</b>	

**Table 3.21. Annual fixed cost**

Items	Unit	Price/unit	Total
Salary for indirect labor – 2 labor @ 8,000/month	2	8,000	192,000
Bank interest (@ 6%)			204,000
Depreciation			250,000
Maintenance of raceways and water canals (5% of fixed assets)			212,900
Telephone/communication			25,000
Gasoline (for bike)/Traveling			30,000
<b>Total</b>			<b>913,900</b>

### 3.2.8 Labor

Only 2 indirect labors are working in his project. Labor monthly salary is NPR 8,000/month with full accommodation (lodging & food) in his project. Occasional direct labors are also hired. All family members (parent, his wife & himself, younger brother & brother's wife) are involved in this enterprise.

### 3.2.9 Variable cost

Variable cost of his project is NPR 2,016,250 which stands 69 percent of the annual total cost. As given in annex Table 3.22, feed is the main component within variable cost. Feed alone covers about 68 percent of the total variable cost. He is providing 100 kg grinded liver (of buffalo and chicken) mixed with other feed during 1<sup>st</sup> month to fingerlings in the main raceways. He provides >35 percent protein content feed up to 6 months. Within feed, price of protein i.e. dry shrimp imported from Calcutta, Dhaka, Thailand and Indonesia is very high. These are imported by Nepali and Indian traders.

**Table 3.22. Annual variable cost**

Items	Volume in kg	Rate/unit	Total
51% feed up to 20 gm for 2 months	400	250	100,000
45% protein, up to 60 gm body weight	500	180	90,000
35% protein feed	750	150	112,500
20% protein feed for table fish	13,000	90	1,170,000
100 kg Liver of buffalo and chicken	100	250	25,000
Fry 2 gm size fingerlings (number)	25,000	5	125,000
Glass water/tools/chemicals/net			15,000
Farm fuel			20,000
Electricity			25,000
Others (oil, medicine, salt for treatment)			30,000
Oil, spices, gas and other charge for cooking	4,050	75	303,750
<b>Total Variable cost</b>			<b>2,016,250</b>
<b>Total annual operating cost</b>			<b>2,930,150</b>

Around 3.3 to 3.5 kg of feed is essential to produce 1 kg of trout (PI Rumba, 2014). Food loss is also high. It is mainly due to nature of fish growing in running water. 2<sup>nd</sup> highest cost causing component includes fish frying/cooking materials accessories like edible mustard oil, spices, gas and fuel. Fry/fingerlings cost is 5 percent among total variable cost and rate per fry/fingerling is NPR 5.

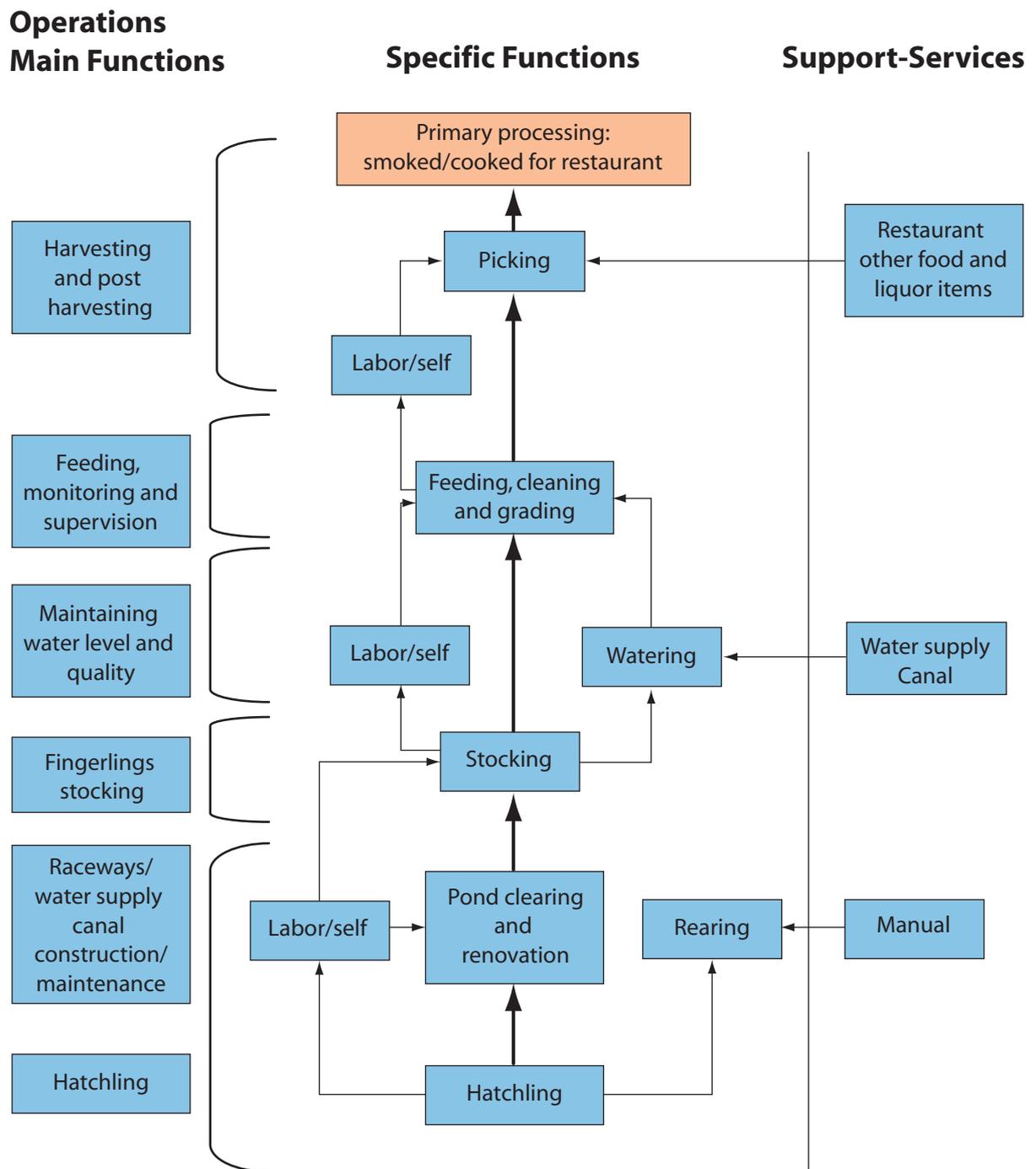
### 3.2.10 Value addition

Value chain is very short in this enterprise. Role of producer, collector, trader, processor and again trader is performed by the producer himself (Figure 3.6).

Total production cost for one kg of trout in his farm is NPR 651.1 (total annual production cost NPR 2,930,150 divided by 4,500 kg). About 10 percent is live sale @ NPR 1,000/kg, with margin NPR 348.9/kg i.e. 53.6 percent margin on live sale. Though margin on live sale is satisfactory, they are mainly interested on selling of cooked fish as it has multiplier effect like selling of local agricultural commodities produced by local communities, selling of other food items including liquor and soft drink. Margin on these items is attractive. Customers are also taking it as entertainment plus domestic tourism.

Margin on per kg sale of cooked fish (trout from own farm) is NPR 573.9/kg (NPR 1,300 selling price-NPR 651.1 production cost-NPR 75 cooking charge) which is 79 percent of the production cost.

**Figure 3.6. Trout production process**



(Source: Authors, 2014)

Margin on per kg sale of cooked fish (traded trout i.e. 1,000 kg) is NPR 325/kg (NPR 1,300 selling price-NPR 900 buying cost-NPR 75 cooking charge) which is 33.3 percent of the production cost.

Price of cooked fish varies from NPR 1,300 to NPR 1,500/kg. Rate is comparatively higher during winter and period of low supply.

**Table 3.23. Value chain analysis**

Items	Producer	Customers
Total fish production in kg	4,500	
Total annual production cost of trout	<b>2,930,150</b>	
Production cost per kg of Fish in Rs	651.1	
Price per kg of live fish	900	1,000
Margin per kg of selling live fish		
.....From own farm	248.9	
.....From trading of live fish	100	
Margin % per kg		
.....From own farm	38.2	
.....From trading of live fish	11.1	
Value addition cost		
Cooking charge per kg	75	
Total cost for one kg of cooked fish		
.....From own farm	726.1	1,300
.....From trading of live fish	975	
Margin per kg of cooked fish		
.....From own farm	573.9	
.....From trading of live fish	325	
Margin %		
.....From own farm	79.0	
.....From trading of live fish	33.3	

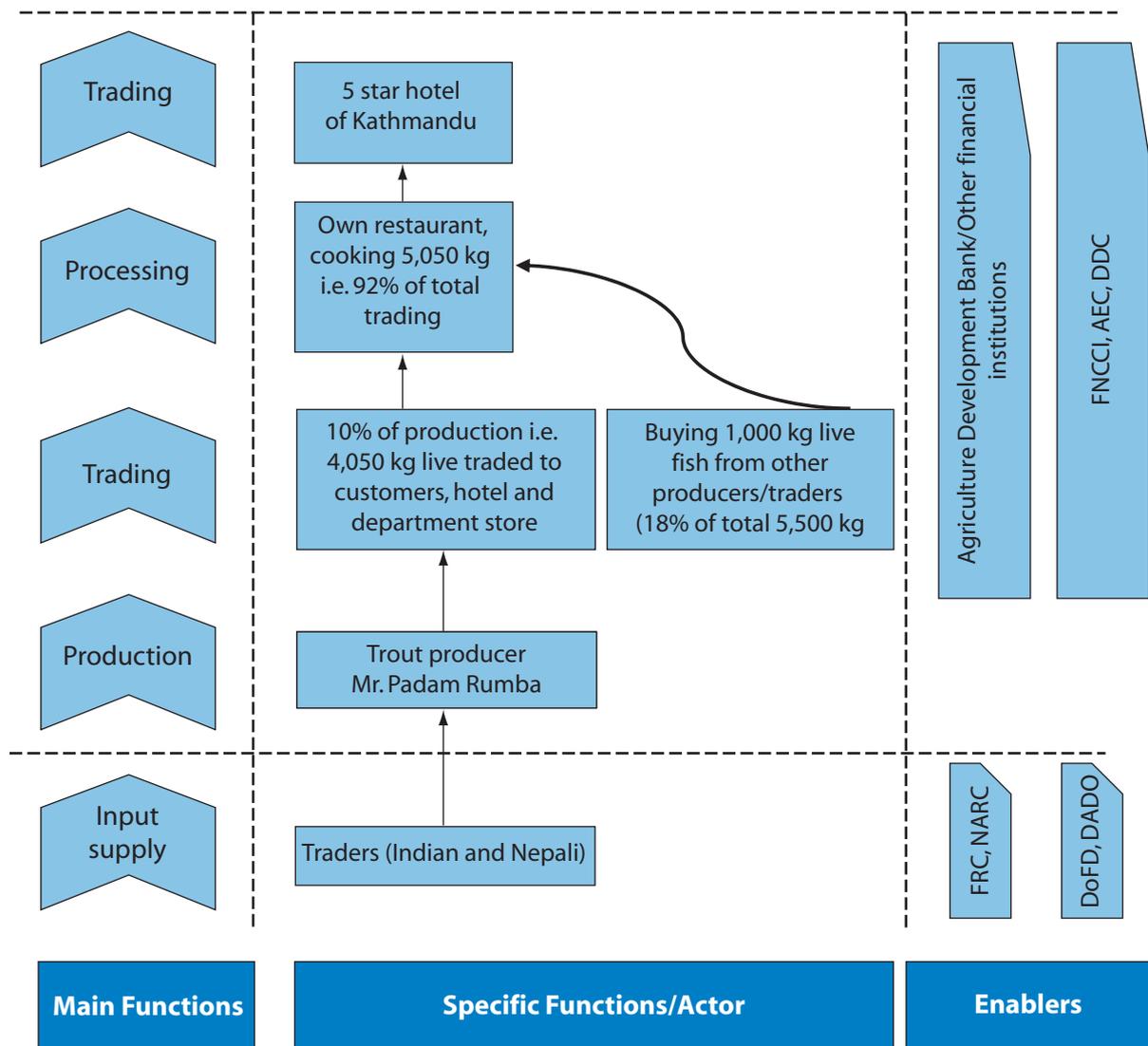
### 3.2.11 Profit analysis

Profit from rainbow trout enterprise is very attractive and encouraging. Break Even Point (BEP percent) is only 23 percent, which clearly shows it is financially significant and the project has sufficient capacity to generate profit even in few shocks/stress. In the same way Benefit Cost Ratio (BCR) is 1.8. It clearly shows, project is financially highly profitable. RoI of the project is about 100 percent. Moreover, expense, income and profit from only rainbow trout are considered in income and expense analysis. Other activities like food items, liquor/soft drink and night stay charge are not included, though profit margin from these activities is significant. Detail analysis of income and expense is presented in Table 3.24.

**Table 3.24. Profit analysis**

Profit analysis	Amount
Fixed cost	913,900
Variable cost	2,016,250
Total annual expense of own project	2,930,150
Total annual expense with trading of live fish 1,000 kg (live fish @900/kg = 900,000 and making charge Rs 75/kg = 75,000)	975,000
<b>Total variable cost</b>	<b>2,991,250</b>
<b>Total annual expense</b>	<b>3,905,150</b>
Sales revenue	
Selling of live fish 450 kg @ 1000/kg	450,000
Selling of cooked fish 4,050 (90% of 4,500 kg) +1,000 kg @ 1,300/kg	6,565,000
<b>Total Sales revenue</b>	<b>7,015,000</b>
Profit	3,109,850
Break even analysis	22.71
BCR	1.8
Return on investment (RoI)	100.80

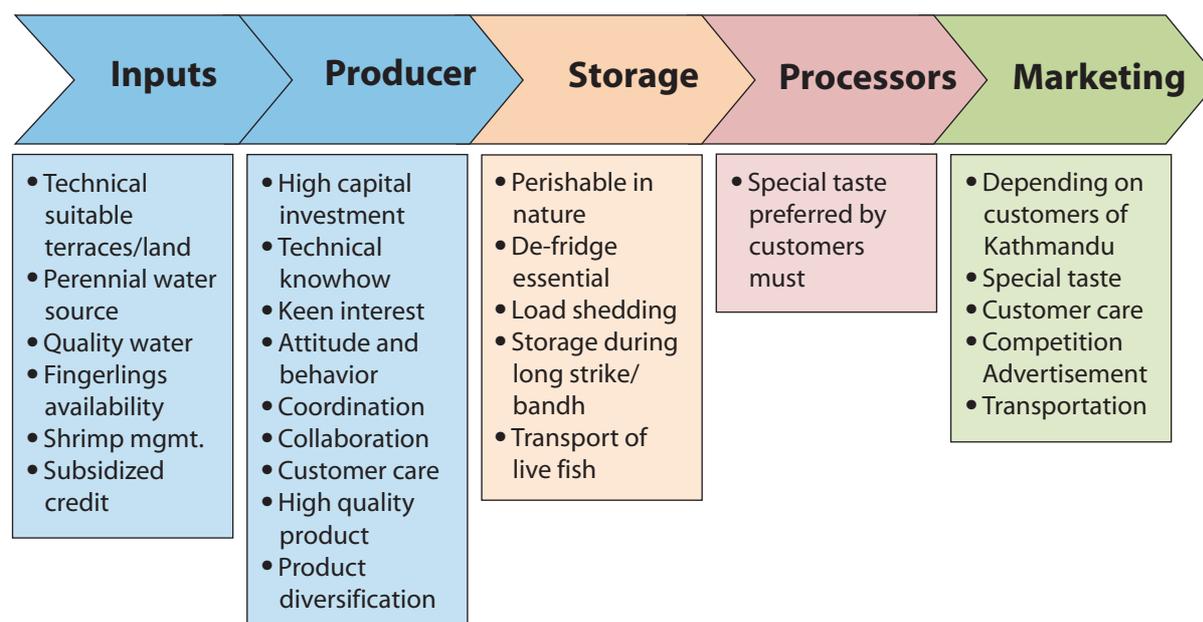
**Figure 3.7. Trout value chain map**



(Source: Authors, 2014)

### 3.2.12 Risk

Natural calamities: Trout farming is highly sensitive to natural calamities. This enterprise is in open space, and quality cold running water is most essential. Any malfunction or defect in water quality is dangerous. Trout may die if running water is stopped for more than 30 minutes. Perennial water source is most essential. Water source is coming from forest, which is the property of public and community. Thus, it is highly vulnerable to landslide, flood and draught. In addition to these, the 2 mega hits of earthquake during April 25, 2015 and May 12, 2015 followed by many aftershocks have badly damaged foundation of raceways. There were many cracks on the raceways. Around 7,000 fingerlings have been died through these cracks.

**Figure 3.8. Risks along the rainbow trout Value Chain**

(Source: Authors, 2014)

Other risk factors associated with trout business are illustrated below:

- Oxygen level must be 7 PPM or more. Fish will die if oxygen level is low. Thus very risky in rainy season
- Water temperature should be less than 18 degree centigrade
- Quality of feed (50 percent feed is prepared from shrimp)
- Management of raceway-within 3 weeks
- Insurance: always vulnerable to conflict, natural calamities, water quality and political instability. Thus there should be provision of insurance of the project.
- Political risk: though it is not within the control of the owner, one should watch and should vigilant toward blockage of road and other instability.
- Availability of quality feed ingredient mainly availability of quality shrimp at affordable price
- Management: highly technical knowhow and skill is essential for hatchery management, water quality supervision/management, feed management, business planning, trout growth monitoring, products diversification, customer's satisfaction and advertisement.
- Availability of sufficient water: very risky enterprise, as it depends on other stakeholders.
- Conflict among forest users committee/local communities: The sources of water of his project is the natural spring water tapped from the forest situated on west of his project. Any conflict among the forest users committee may be very risky. In the same way, quality of water pollution/infection due to pesticide used in agricultural crops, dead body of animals/birds) may be very dangerous.

### 3.2.13 Essential support

- Insurance provision: it must be insured under agricultural insurance program. Trout producer should be eligible for the rebate in premium provided by Government of Nepal.
- FNCCI-enterprise development unit: should act as catalyst agents or should act as bridge between service providers and producers.

- Provide knowledge and technical assistance on production, preservation, marketing of products,
- Availability of quality and affordable inputs (fingerlings, shrimp, other feed ingredient)
- Support/subsidy policy for construction of raceways and feed machine
- Support in establishment of processing industry
- Continue support/subsidy in agricultural credit
- High levels of communication and coordination among chain actors (almost all have cell phone)
- Customer service Excellency: customers are the real boss, thus their food choices/preference should be considered seriously. Products must be hygienic/healthy, neat & clean restaurant and special taste.

### 3.2.14 Impact

- Impact of his rainbow trout project in the last 14 years of implementation is very positive. Among others, the owner Mr. Padam known as "2<sup>nd</sup> rainbow trout producer of Nepal is the most effective according to him. Now, among trout producers/traders and others he is famous with this nick name. On the basis of discussion with him and his family members, few impacts are as follows:
  - Natural: bought land for hatchery farm in Rasuwa district
  - Human resource: well trained and providing training to other farmers, working as local resource person for various training related to trout production and its marketing. Government trout research farm, district agricultural development office and other agencies are mobilizing him as local resource person.
  - Physical: construction of 10 more raceways (started from 7, now is 17) repair and maintenance of raceway, improvement of house/restaurant construction, freeze (Defreeze) of 200 kg, feed machine
  - Financial status: saving in financial institutions, increase in loan transaction, credibility among financial sectors (many banks are requesting for credit and other financing facilities, higher credibility among trout producers/traders
  - Social status: empowered, well known in society; district and whole nation as 2<sup>nd</sup> trout producer of Nepal. Credibility among business society, member of trout producers association, very happy family 6 persons from family i.e. father, mother, himself, his wife, his younger brother and wife of his brother all are involved and their home is on the bank of the fish pond, thus better protection. Local communities are also benefited as labor, learning trout production skill, getting better opportunities in other trout farms, selling organic agricultural products.

### 3.2.15 Potentials

His present project is at 2<sup>nd</sup> place, close to his home. In the beginning, he had constructed raceways just near his native home, these all have badly damaged/collapsed by the mega hit earthquake. Demand of trout is high and he is feeling problems in managing customers during weekend/holidays of spring and winter season. Thus it is wise to reconstruct raceways and start the new project. Rainbow trout (*Oncorhynchus mykiss*) is a high value exotic cold water fish. It prefers clean, cold and high oxygen water for its growth and survival (Gurung & Basnet 2003).

### 3.3 Tomato Value Chain Finance

#### 3.3.1 Overview of Tomato

Tomato is one of the most important products and ranks second after potato in the world. Total area of cultivation under tomato in the world turn out to be 4,582,438 thousand ha with production of 150,513,813 thousand tons and productivity of 32.8 tons/ha in FY 2010/11. Please see Table 3.25 for its detail. In Nepal tomato is also considered as the major vegetable production that extends extensively in all districts. In 20 years of Agriculture Perspective Plan (APP) of Nepal vegetable crops are considered as one of the highly prioritized crop for agricultural development of the country as a whole. Fresh seasonal and off-season vegetables have been categorized as high value crops including tomato. Vegetable status of Nepal during the five fiscal years (2009/10-2013/14) is depicted in Table 3.26.

**Table 3.25. Production of tomato in the world**

Country	Major Tomato Producing Countries in the World (2010-2011)			
	Area ('000 ha)	Production ('000 tons)	Productivity (tons/ha)	% Share of World Production
China	871,235	41,879,684	48.1	28
India	865,000	16,826,000	19.5	11
USA	159,200	12,902,000	81.0	9
Turkey	304,000	10,052,000	33.1	7
Egypt	216,385	8,544,990	39.5	6
Italy	118,822	6,024,800	50.7	4
Iran	146,985	5,256,110	35.8	3
Spain	58,300	4,312,700	74.0	3
Brazil	60,772	3,691,320	60.7	2
Mexico	98,189	2,997,640	30.5	2
Others	1,683,550	38,026,569	22.6	25
<b>World + Total</b>	<b>4,582,438</b>	<b>150,513,813</b>	<b>32.8</b>	

**Table 3.26. Area, production and yield of vegetables in Nepal from 2009/10 to 2013/14**

Year	Area (Hectare)	Production (mt)	Yield (kg/ha)
2009/10	235,098	3,003,821	12,777
2010/11	244,102	3,203,563	13,124
2011/12	245,037	3,298,816	13,463
2012/13	246,392	3,301,684	13,400
2013/14	254,932	3,421,035	13,419

(Source: MoAD (2013/14). Statistical Information on Nepalese Agriculture).

#### 3.3.2 Entrepreneur

Mr. Krishna Prasad Ghimire, 37 years old is one of the residents of Jeevanpur VDC of Dhading, Nepal. He could not continue his study after grade 9 due to poor household economy and also shouldering responsibility to support his family through involving himself in traditional subsistence agriculture. He has strong willingness, commitment and dream to improve livelihoods of his household through adopting innovative commercial agriculture. He adopted improved rabbit raising; hybrid papaya farming; rice processing mill, vegetable farming and now integrated agro care farm. He is farming hybrid tomato in 50 tunnels with the credit support of Agricultural Development Bank Ltd. and other financial institutions.

He is working as role model for youths of his community as a lead farmer in commercialization of vegetables. He is honored by "President Award" for his outstanding leading role in agricultural sector. Many financial institutions are approaching to him for financial services. Table 3.27 shows the cost of production of plastic tunnel based on the farm of Mr. Ghimire.

**Table 3.27. Cost of Production of Tomato (Per Tunnel)**

<b>Investment (Tunnel size 15 M*6 M)</b>	<b>Volume</b>	<b>Unit Price</b>	<b>Amount</b>	<b>% within sub total</b>	<b>% in total cost</b>
Land lease (for 10 years @ Rs 8,000/ropani/year, thus for one tunnel it will around Rs 3,000)			3,000	21.9	
<b>Inputs</b>					
Seed (Gram): Seed pocket of 2 gm	2	375	750	5.5	
Organic manure (Qt), collected from local area	5	500	2,500	18.2	
Chemical fertilizer - DAP (kg)	10	55	550	4.0	
Potash (kg)	2	25	50	0.4	
Bio-pesticide (Neem), vitamins and hormone (Lump sum for one cycle)	1	4,500	4,500	32.8	
Electricity charge (drip irrigation machine, pumping @5,000/month for 50 tunnels, thus for one tunnel around 100/month plus 200 depreciation expense)			1,700	12.4	
Power tiller for tilling purpose (hour)	1	650	650	4.7	
<b>Sub-Total</b>			<b>13,700</b>	<b>100.0</b>	<b>27.6</b>
<b>Labor requirement for one crop cycle (for months)</b>					
Land preparation	2	500	1,000	8.3	
Land leveling	0.5	500	250	2.1	
Manure application	0.5	500	250	2.1	
Transplanting	2	500	1,000	8.3	
Irrigation (drip irrigation)	2	500	1,000	8.3	
Weeding, Stacking, pruning	6	500	3,000	25.0	
Pesticide application	1	500	500	4.2	
Harvesting/transportation	10	500	5,000	41.7	
<b>Sub-Total</b>			<b>12,000</b>	<b>100.0</b>	<b>24.2</b>
<b>Plastic Tunnel construction/maintenance</b>					
Plastic tunnel (fixed cost for one crop cycle) – total cost Rs 40,000, life 3 crop cycles, annual maintenance expense 2000			15,000	83.8	
Stacking: fabric rope	180	5	900	5.0	
Drip irrigation plastic pipe (Lump sum)			2,000	11.2	
<b>Sub-Total</b>			<b>17,900</b>		<b>36.1</b>
<b>Total production cost</b>			<b>43,600</b>		
Interest @11% for 15 months			5,995		<b>12.1</b>
<b>Total production cost</b>			<b>49,595</b>		<b>100.0</b>
<b>Production kg</b>			2,982	Profit/tunnel	<b>BCR</b>
Tomato production (kg)	2,982	28.2	84,210	34,615	<b>1.70</b>
Decrease in Prod by 20%	2,385.6	28.2	67,368	17,773	<b>1.36</b>
Decrease in price by 20%	2,982	22.6	67,368	17,773	<b>1.36</b>
Decrease in prod and price by 20%	2,385.6	22.6	53,894	4,299.4	<b>1.09</b>
Per kg prod cost			16.6		

### 3.3.3 Major stakeholders

Major stakeholders in tomato value chain include input supply, production under tunnel, transportation, primary trading, wholesaling, retailing and import/export. Followings are major actors involved in tomato value chain.

#### Input Suppliers

Basic inputs such as seed, fertilizers, pesticides and agriculture tools/equipment are supplied by agro-vets. It is estimated that about 15 national level and 230 local level agro-vets are supplying production inputs to tomato producers.

#### Producers

Tomato is one of the most popular vegetable cultivated by almost all of the households in the Terai to mid-hills of Nepal, mostly for home consumption. With opening of new roads, change in consumption pattern and rapid urbanization, tomato market demand has been increased and production has also been initiated in new locations. In the recent time, tunnel production technology has gained momentum in mid hills and even small farmers have started tomato cultivation in tunnel. Most of the tunnel farming is concentrated around the market centres and along the major roadsides.

#### Traders

Traders play crucial roles in tomato value chain from production to marketing. Different types of traders are involved as:

##### Primary Collectors

Normally farmers bring their products to specific location within village where primary collectors collect them and transport it to desired markets.

##### Wholesalers

Traders involving in wholesaling of tomato are mainly involved in large scale transaction of tomato. They purchase tomato either from primary collector or their agents and supply to the retailer. Some of them act as national level traders or exporter also. Those wholesaler are based at major urban centres, have reasonable storage space, have good network with other traders (at local and distant market) and also with importer/exporters.

##### Exporters/Importers

Tomato produced during main season is not exported as the harvesting time in Nepal and bordering states of India are more or less the same. Part of off-season (summer) tomato is exported to Indian markets in Uttar Pradesh, Bihar and West Bengal as tomato production in those areas during summer/rainy season is limited to controlled environment only, making it expensive. Similarly, tomato is also imported from India whenever local production is not enough or there is large difference in prices. Some of the large scale wholesalers are involved in such export and import business. During interactions with stakeholders it was revealed that successful exporters/importers are those that operate their business in either side of the border.

##### Retailers

There are no retailers that trade tomato only. Retailing of tomato is done by vegetable traders and grocers. They buy required quantity from wholesalers as well as directly from farmers in isolated cases. Vegetable retailers are found in every corner of major markets. There are also some vendors that sell tomato along with other vegetables door to door. In general retailers buy 100 to 150 kg at a time and sale to the consumers.

## Supermarkets

Supermarket culture is relatively new in Nepal, but this concept is growing very fast. Some of them are also involved in the retailing of the fresh as well as processed tomato products, together with other vegetables and fruits. Some of the producer directly contact with supermarket in large cities such as Kathmandu and Pokhara for supply of fresh tomato while some of supermarkets purchase fresh tomato from the wholesalers. There are also some traders that sale only organic vegetables including tomato. Though their number is limited, they are getting popularity in recent past, especially among the foreigners and high economic status people in Kathmandu.

## Processors

In spite of the potentialities of tomato to convert into ketchup, juice, sauce, pickles, dried puree etc. to add significant value, there are very few processing industries in the country. Due to the excess demand of fresh tomato, processing activities is not prioritized by the stakeholders.

### 3.3.4 Production Process

Tomatoes produced in his farm go through six basic operations:

- 1) Seedbed preparation/seedling production
- 2) Plastic tunnel preparation
- 3) Land preparation
- 4) Transplanting
- 5) Weeding/stacking/fertilizer/bio-pesticide application/drip irrigation and
- 6) Harvesting.

Table 3.28 shows the total cost of distribution of Mr. Ghimire farm. Figures 3.9 and 3.10 show the main activities and a generalized flow diagram of the entire production process respectively. Mechanization exist for limited activities like ploughing through power tiller; irrigation as well as chemical fertilizer application through drip irrigation system and hand held sprayers are used for pesticide application.

**Table 3.28. Cost distribution**

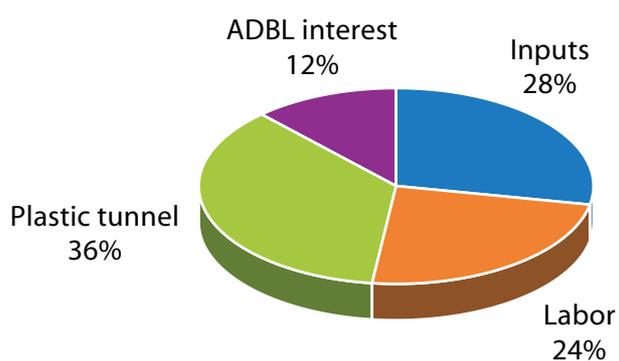
Main items	NRs	%
Inputs	13,700	28
Labor	12,000	24
Plastic tunnel	17,900	36
ADBL interest	5,995	12
Total	49,595	100

Share of inputs labor, plastic tunnel and interest repayment to Agricultural Development Bank Ltd. (ADBL) is 28 percent; 24 percent; 36 percent and 12 percent respectively. Bank interest rate is calculated at prevailing rate of 11 percent excluding the government subsidy of 4 percent. Inclusion of 4 percent subsidy will further save about one-third of interest expense. Cost and income is calculated as per discussion with the producer. Main cost items for tunnel tomato production are preparation of plastic tunnel; inputs and labor. Graph 1 clearly shows the share of production cost of tomato cultivation of the producer. Average cost for one plastic tunnel is NPR 40,000; life span is 3 crop cycles; thus depreciation is calculated NPR 13,000 per crop cycle plus NPR 2,000 maintenance cost per year, fabric rope for stacking and plastic pipe for drip irrigation is also considered. Within inputs cost share of bio-chemical is the highest to the tune of 33 percent followed by manure, lease land charge and electricity charge (Graph 2).

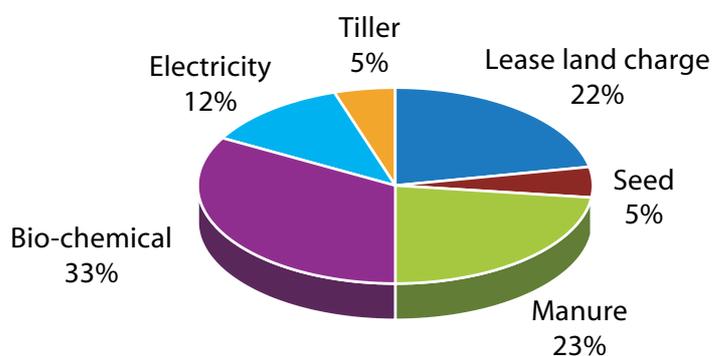
**Figure 3.9. Main activities of Tomato production**

Activities	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Land preparation, seedbed preparation, seeding, seedling preparation	█																	
Main field preparation, manuring, tunnel preparation Transplanting		█																
Drip irrigation; fertilizer application		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Weeding, Stacking, pruning			█	█	█	█	█	█	█	█	█	█	█	█				
Bio-pesticide; vitamins, Harmon application		█		█			█			█			█			█		
Harvesting				█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

**Graph 1. Share of production expense of Tomato**

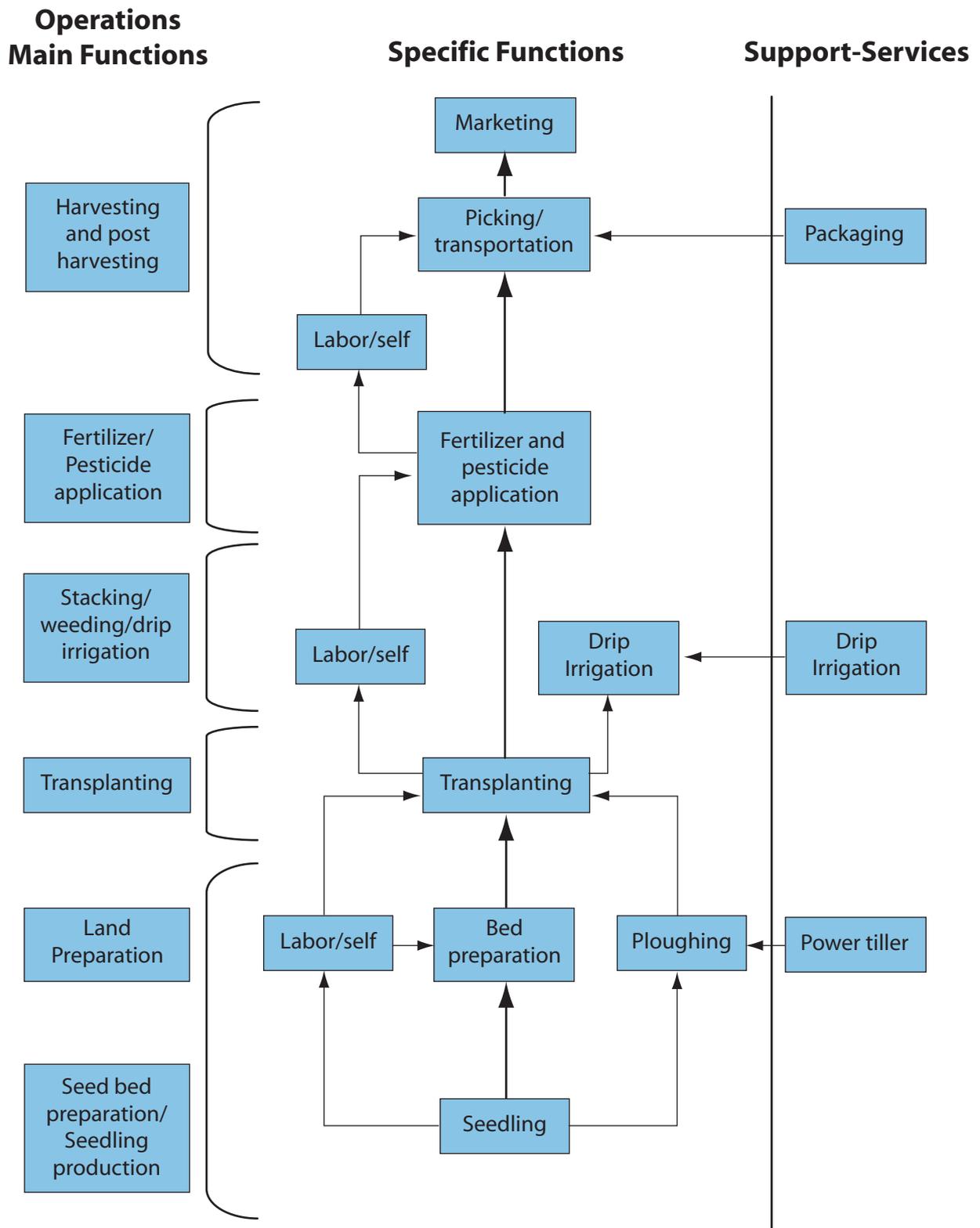


**Graph 2. Inputs breakdown**

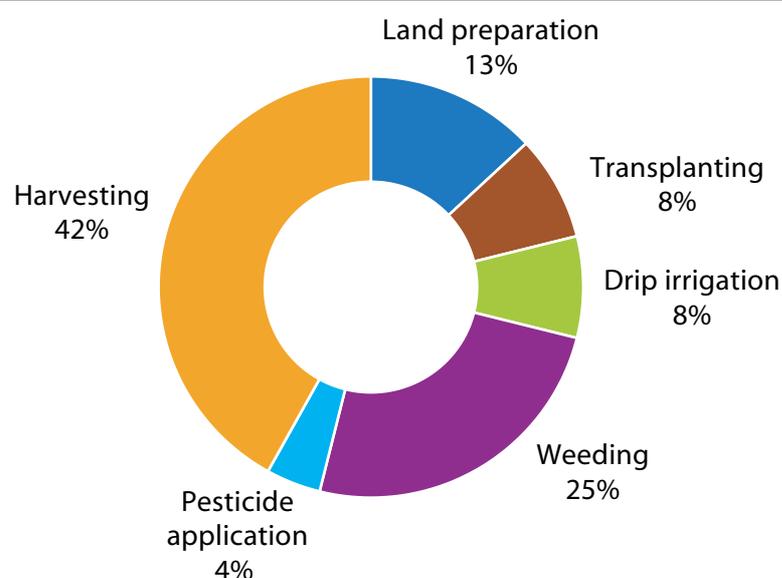


The producer only uses bio-chemicals for plant protection and Harmon. Organic manure is collected from local community and chemical fertilizer from the local market about 4 km from the farm. Only 2 grams of hybrid seed is needed for plantation in one tunnel, however quality of seed is one of the binding factors of success. Electricity charge is for operation of drip irrigation motor.

**Figure 3.10. Tomato Production Process**



(Source: Authors, 2014)

**Graph 3. Share of labor expense**

Tomato cultivation is highly labor intensive crop. Labor is required from the beginning to end such as for seedbed preparation, mulching, main field preparation, organic manure mixing, transplanting, weeding, irrigation, fertilizer application, stacking, harvesting. As hybrid tomato in tunnel produces fruits for about 15 months, labor requirement is more for harvesting purpose followed by weeding. Graph 3 vividly shows that these two activities cover more than two third (67 percent) of labor cost. The cost of cultivation in tunnel system is higher than the traditional system, but the production and benefits are also higher in this system. The total production cost for one tunnel i.e. 15 M (meter)\*6 M (meter) = 90 M<sup>2</sup> area is NPR 49, 595 which is double than the normal system. Table 3.29 shows the profitability analysis of the plastic tunnel fo Mr. Ghimire farm.

**Table 3.29. Profitability analysis**

Production kg per tunnel	Prod	Rate	Profit	BCR
Normal	2,982	28.2	34,615	1.70
Decrease in prod by 20%	2,385.6	28.2	17,773	1.36
Decrease in price by 20%	2,982	22.6	17,773	1.36
Decrease in prod & price by 20%	2,385.6	22.6	4,299.4	1.09
Prod cost per kg		16.6		

The financial analysis of tunnel tomato cultivation shows Benefit Cost Ratios (BCR) of 1.7 for normal condition, 1.36 for 20 percent decrease in production or 20 percent decrease in projected price and 1.09 for decrease in production as well as price by 20 percent. The BCR value clearly indicates very good profitability from tunnel tomato cultivation. Table 3.30 clearly shows investment of NPR 1 generates 0.70 paisa income after covering all annual operating expenses. The BCR will be even more as there is no possibility of decrease in price rather there is chance of increase in price resulting high probability.

On top of that, lower range of selling price throughout the season is taken with higher side of 11 percent interest rate instead of 6 percent interest rate as per the directives of the Government of Nepal. Yield is also considered at lower side (average weight of tomato per carat was said 23 kg, but we have considered only 21 kg) in order to enable the producer to face any shock/stress during the production period. Production of tomato per plant is found 16.6 kg, however farmer obtain around 20 kg production per plant, farmer obtains tomato fruits for 15 months, however we have considered only 13 months, thus there is probability of increase in income and this business is highly profitable. Average interest rate on deposit is only 5 percent, thus it is highly profitable to invest in this business.

**Table 3.30. Tomato production**

Activities	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Tomato Production (caret)	5	8	12	15	15	15	15	10	10	10	10	10	7
Tomato weight in kg (21 kg per caret)	105	168	252	315	315	315	315	210	210	210	210	210	147
Price per kg	25	30	35	35	40	40	35	20	10	15	15	20	25
Total income	2,625	5,040	8,820	11,025	12,600	12,600	11,025	4,200	2,100	3,150	3,150	4,200	3,675

Total production: 2,982 kg, production per plant: 16.6 kg  
 Plant per tunnel: 200, mortality 10%, thus net plant will be 180  
 Total income: 84,210

### 3.3.5 Special features

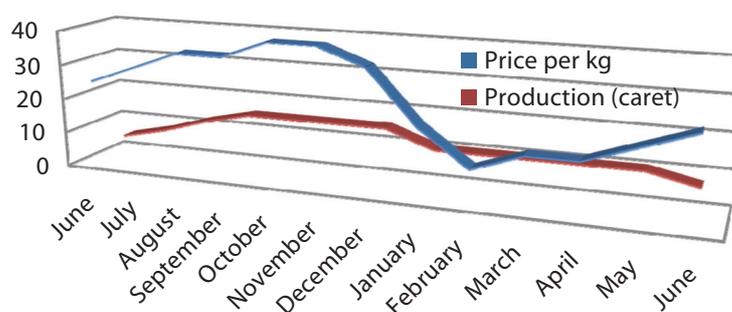
Generally tomato production in Terai as well as in India is from the month of January to March. Many festivals and social function like marriage and other ceremonies fall during the months of April to December resulting high demand and very attractive price. This is a natural gift for the tunnel tomato producer of the mountain region, where climate is suitable for tomato production throughout the year especially during the off-season of terai region.

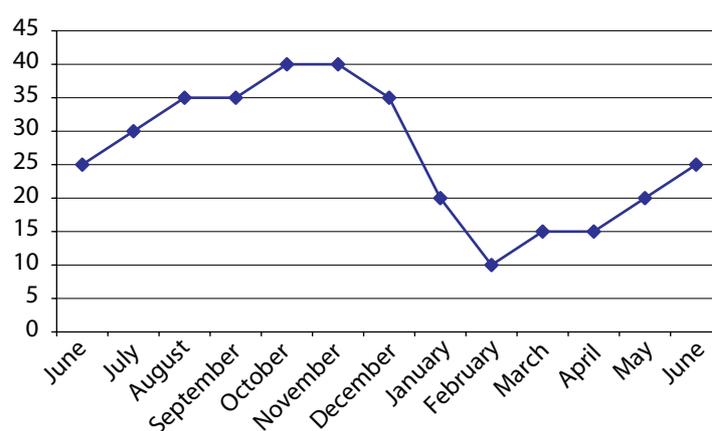
### 3.3.6 Trade Flow and Volume

According to the producer, almost all tomato produced in his farm is for fresh consumption and is consumed mostly within the country mainly Kathmandu and local market. He sales fresh tomato and on an average 70 percent sale is in Kathmandu "Kalimati wholesale vegetable market" and 30 percent is in local wholesale market known as "Dharke". Wholesalers of Dharke supply tomato to Kathmandu and other cities like Pokhara and Narayanghat. Wholesalers of Kathmandu trade to retailers. These retailers are mostly from Kathmandu valley; however few are even from Terai region during off-season of Terai. He harvests and markets tomato daily during peak season and on alternate day during lower production season.

### 3.3.7 Price Variation

Due to the seasonality of the product, production in Terai and festivals/social events months, the price of tomato also varies considerably through the year as shown in Graphs 4 and 5. Price start increasing from the month of April as tomato production in Terai region is completed and it is at the peak during the month of October and November. Generally shortage of tomato is faced during these months and the greatest festivals of Hindu such as Dashain and Tihar (Dipawali) also prevail during these months.

**Graph 4. Trend of tomato production and price/kg**

**Graph 5. Price variation on his farm (NRs/kg)**

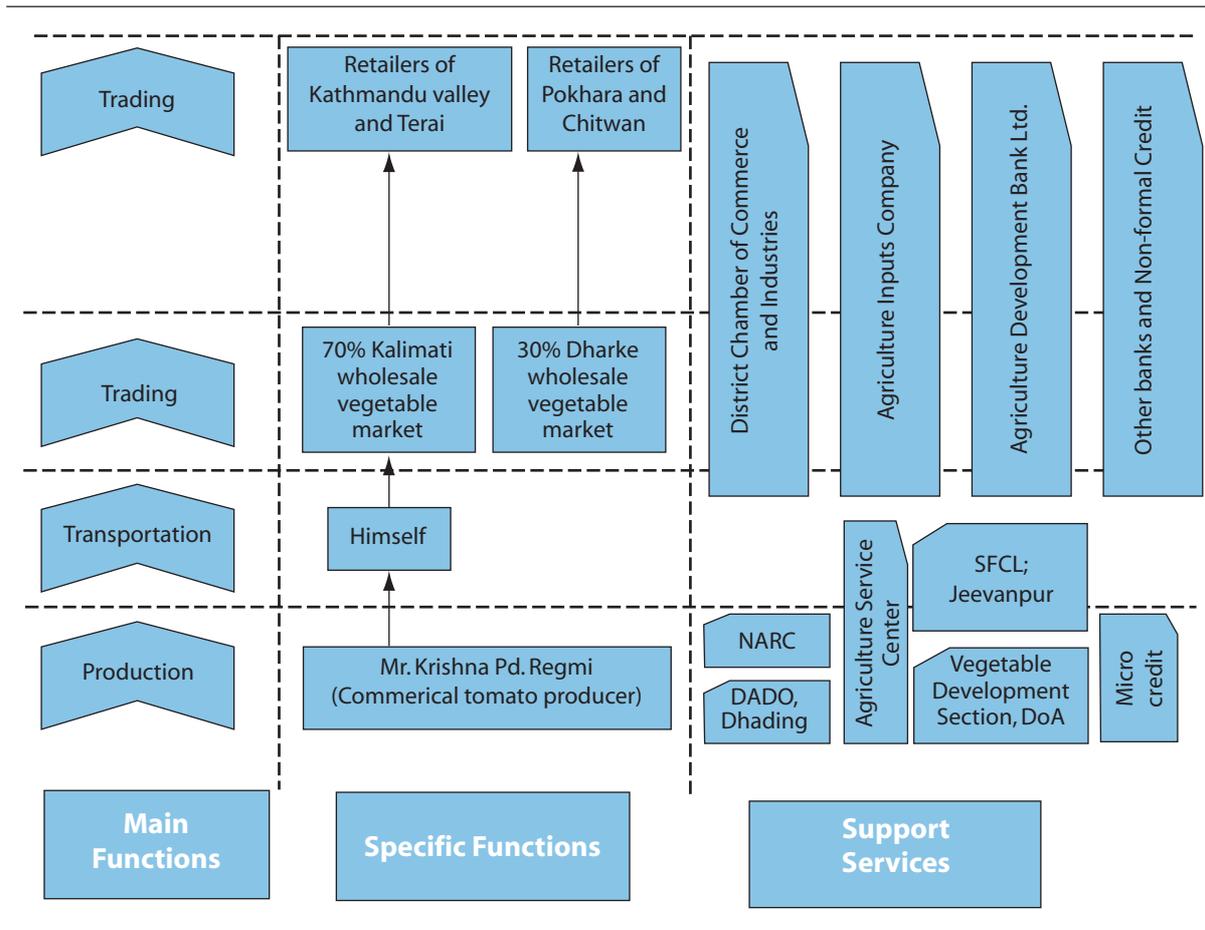
### 3.3.8 Financing system

Internal Financing System	External Financing System
Inputs suppliers (mainly hybrid seeds, bio-chemicals)	Agricultural Development Bank Nepal (Since 17 years, started from US\$ 60 and at present his loan balance was around US\$ 40,000)
Tomato wholesale traders (occasionally to meet the operating cost in crisis)	Small Farmers Cooperative Limited: US\$ around 6,000
Local tomato traders (in emergency)	Other commercial banks: around US\$ 11,000

### 3.3.9 The Value Chain Map

The tomato value chain map (Figure 3.11) provides a graphic representation of tomato as it moves from production to the consumers, passing through different stages and processes. The linkages are shown vertically from bottom to the top. The left hand block lists the major functions of the chain. The functions, in this case, include production, collection, processing/grading, trading and retailing. The middle block depicts the actors involved in carrying out the functions listed on the left. The enablers, shown on the right hand block, assist and facilitate the actors in carrying out their functions. The enablers are mainly the institutions both formal and informal as well as private and public institutions. The roles of the enablers encompass several actors and functions in the value chain. Mr. Regmi is continuously getting financial services from Agricultural Development Bank Limited. He is getting good support (technical support, subsidy on farm equipment) from DADO Dhading and its service center. He gets inputs like hybrid seed, bio-chemical, plastic and other inputs.

**Figure 3.11. Tomato Value Chain Map**



### 3.3.10 The Role of the Enablers

Government and non-governmental organizations as well as private institutions play important roles in moving the commodity along the value chain. The functions and roles of the enablers are shown below:

Enabler	Role
DADO	<ul style="list-style-type: none"> <li>• Provide technical training</li> <li>• Provide technical backstopping services</li> <li>• Use him as local resource persons</li> <li>• International team (Bhutanese farmers) visited his farm</li> <li>• Manage farmers observation study tour</li> <li>• Potential area identification and selection for pocket program</li> <li>• Awareness creation</li> <li>• Conduction of result demonstration at farmers field</li> <li>• Continuity of IPM (Integrated Pest Management)</li> <li>• Accessibility of quality seed</li> <li>• Subsidy on inputs i.e. seed, plastic sheet, irrigation system and packaging</li> <li>• Subsidy on bank interest rate</li> <li>• Support in district level coordination/networking</li> <li>• Support in marketing/construction of collection center/ware house/cold storage</li> <li>• Support in formation of farmers group/association</li> <li>• Support in export of tomato</li> </ul>

Enabler	Role
NARC	<ul style="list-style-type: none"> <li>• Development of hybrid seed at affordable price (NPR 375 per gm. i.e. NPR 375,000 per kg (present price of hybrid Srijana is very high)</li> <li>• Performance testing of vegetables at research stations and farmers field</li> <li>• Recommendation of variety and use of fertilizers and pesticides</li> </ul>
Vegetable Development Division	<ul style="list-style-type: none"> <li>• Commercialization/Expansion of tomato farming</li> <li>• Potential area identification with the collaboration of DADO</li> <li>• Conducting varietal trials in Nepalese condition (Seed trials)</li> <li>• Supply of seed and seed material</li> <li>• Coordination and networking</li> <li>• Extension materials (booklets, leaflets)</li> </ul>
Farmers group	<ul style="list-style-type: none"> <li>• Awareness creation among farmers</li> <li>• Farmers group formation</li> <li>• Discussion/experience sharing on technical aspects of production practices and advantages</li> <li>• Lobbying/advocacy</li> <li>• Marketing</li> <li>• Coordination</li> </ul>
Cooperatives	<ul style="list-style-type: none"> <li>• Credit and deposit availability</li> <li>• Representative of farmers/farmers' groups</li> <li>• Lobbying/advocacy of member farmers</li> <li>• Marketing of inputs and outputs</li> <li>• Facilitation in management of hybrid seed/recommended seed and other inputs</li> <li>• Coordination with line agencies</li> <li>• Information sharing</li> </ul>
District Chamber of Commerce and Industry	<ul style="list-style-type: none"> <li>• Support in trading of quality as well as affordable inputs and product</li> <li>• Coordination</li> <li>• Lobbying/advocacy with government; banking sector, traders, exporters and processors</li> <li>• Coordination with Indian traders for export of tomato and import of authentic quality inputs</li> <li>• Support in construction of warehouse/storage of vegetable at local areas such as Gajuri/Dharke</li> <li>• Support in establishment of tomato processing industry in local area</li> </ul>
Agricultural Development Bank Ltd. and other commercial banks	<ul style="list-style-type: none"> <li>• Supply of institutional credit in easy accessible manner and with comparatively low interest rate (government interest subsidy)</li> <li>• Other financial services like any branch banking service; cash deposit facility in Kathmandu; remittance; L/C; bond loan</li> </ul>
Agricultural Inputs Corporation/Seed Company	<ul style="list-style-type: none"> <li>• Supply of quality seeds, fertilizers, and other inputs</li> </ul>
Microcredit/cooperative	<ul style="list-style-type: none"> <li>• Supply of small volume of credit</li> </ul>
Non-formal credit	<ul style="list-style-type: none"> <li>• Supply of credit for management of inputs or supply of inputs as credit in easily accessible manner. But interest rate is exorbitant</li> </ul>

### 3.3.11 Value Chain Analysis

The value chain analysis is done using a standard format which shows all costs, losses, margins and prices along the chain and the share of each actor as the product moves from production to wholesale market, retail market and finally up to the consumer. Thus, Table 3.31 illustrates the value chain analysis of tomato produced in plastic tunnel at his farm.

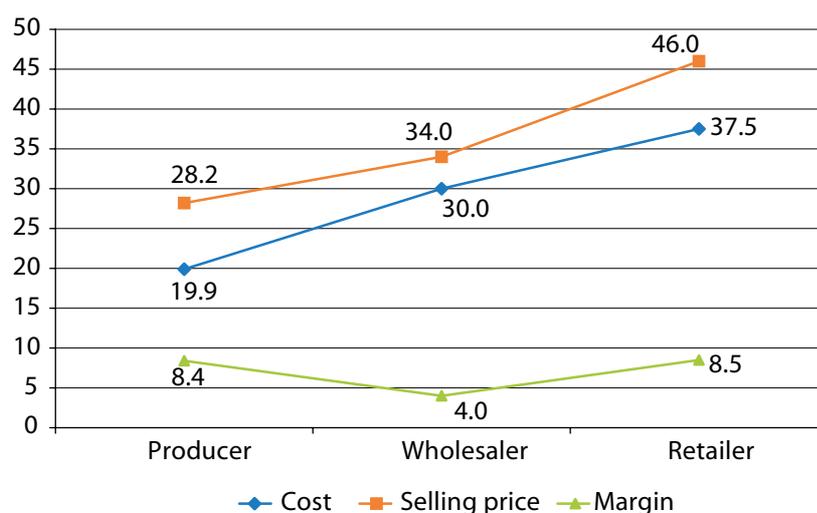
**Table 3.31. Value Chain Analysis**

Farmer		Wholesaler		Retailers	
Item	Cost	Item	Cost	Item	Cost
Production Costs		Sorting, grading	0.25	Transportation	1.00
Seed	0.3	Load unload labor	0.25	Sorting/grading	0.50
Manuring/Fertilizer/ chemical	2.5	Interest, space rent	1	Interest, space rent	0.50
Other	1.8		0		
Labor	4.0	Assembling cost	<b>1.50</b>	Assembling cost	<b>2.00</b>
Plastic tunnel	6.0				
Bank interest	2.0				
Total Production Costs	<b>16.6</b>				
Post Production					
Transportation	1.25	Acquisition Cost	28.24	Acquisition Cost	34.00
		Total Assembling Costs	29.74	Total Assembling Costs	36.00
Total Post Production Costs	1.25				
Total Farm level costs	17.88	Total Wholesaler level costs	29.74	Total Retailer level costs	36.00
Loss: picking, packing, store, transportation	2.00	Losses	0.25	Losses	1.50
Margin	8.36	Margin	4.01	Margin	8.50
Farm gate Price (weightage average)	28.24	Assembler level price	34.00	Wholesale level price	46.00
Margin % (Margin/Total cost* %)	42.0%		13.4%		22.7%
Difference between consumer paying & producers getting				17.76	<b>63%</b>

Per Kg Tomato	Producer	Wholesaler	Retailer
Cost	19.9	30.0	37.5
Selling price	28.2	34.0	46.0
Margin	8.4	4.0	8.5

### Producer Center and Consumer Center

Total production cost for one kg of tomato is NPR 16.6 at his farm level. Plastic tunnel cost; inputs; labor and bank interest share about 36 percent; 27.6 percent, 24.2 percent and 12 percent of cost respectively. Life span of plastic tunnel is assumed 3 crop cycles as per discussion with the producer. Within labor cost share of harvesting and weeding covers more than two-third. Within inputs cost; share of bio-chemical; lease charge and organic manuring is 33 percent; 22 percent and 18 percent respectively. For detail analysis, please review tables and Graph 6.

**Graph 6. Tomato per kg cost and income**

The post production cost is estimated at NPR 3.25 per kg. Within this, transportation and losses costs are NPR 1.25 and NPR 2 per kg respectively. Weighted average farm gate selling price per kg is NPR 28.2; thus farmer gets selling margin of NPR 8.4 per kg at the farm. Margin at farm level is 42 percent. Adding up all these expenses results in the farm gate price of NPR 19.9 per kg of tomato.

The wholesalers add another Rs 5.76 per kg to the cost of tomato which includes the assembly cost (NPR 1.5) at the wholesale level, loss and a margin of NPR 4.01 per kg. This results in the wholesale price of NPR 34.0 per kg.

Finally, the average retail price of tomato for the consumers in Kathmandu is around NPR 46.0 per kg, as the retailers add another NPR 12.0 per kg. The added costs at the retail level include sorting, grading, and local transportation comes to NPR 2 per kg. Losses at the retail level amount to NPR 1.50 per kg, and a margin of NPR 8.5 per kg is obtained by the retailers.

Margin of producer, wholesalers and retailers is 42 percent; 13.4 percent and 22.7 percent respectively. Farmers have to bear all the risk of production and transportation to market, thus as compared to traders, margin of farmer seems lower. While margin at retailers level seems higher. Difference in price between farmers receives and consumer pay per kg is NPR 17.8 (63 percent). It seems very high and could be decreased through appropriate measures like construction of warehouse/storage facility; price information system, awareness creation and good marketing channel. Consumers have to pay even more price to retailers during festive season mainly Dashain (Worship of goddess of power) and Tihar (Worship of goddess of wealth).

Production cost could be decreased by decreasing or providing subsidy for plastic for tunnel preparation; development or import of weeding machine/equipment; development of bio-chemical and managing of institutional credit at cheaper interest rate. There is acute shortage of youth in rural area, thus mechanization of vegetable farming is quite essential. Government should launch special program to attract the youth from going overseas.

Tomato price of Kathmandu is decreased significantly during the peak season of tomato production in Terai. Producer Mr. Regmi has to sale even less than cost of production during this period. Therefore warehouse or special storage facility should be constructed by Government. Tomato processing industry should be established in Dhading district or Kathmandu.

## Major Issues and Problems

Numerous problems and issues identified during the discussion with entrepreneur, observation of the farm and wholesale/retailer market and desk study are as follows:

- Unavailability of required amount of agricultural credit. Valuation of rural mountain terrace land is very low for banking sector, thus collateral is one of the main factors for unavailability of institutional credit in required amount.
- Frequent strike, highway blockage due to continue political instability
- Very high cost of inputs (plastic sheet; fertilizer; plant protection bio-chemicals, seed, labor)
- Labor unavailability and high cost (up to NPR 500/day/labor with lunch and breakfast)
- Inferior quality and adulteration of inputs: seeds, fertilizers, pesticides
- Lack of technical knowledge about optimal use of drip irrigation, application of fertilizer and bio-chemical through drip irrigation; hi-tech production technology; harvesting technology; and technology for grading; storage and plant protection
- Lack of proper packaging, sorting, and grading techniques
- Limited value addition (We can increase by processing as well as grading and packaging and proper storage)
- Unavailability of processing industry as well as appropriate storage facility

## Conclusion and Recommendation

### Conclusion

Tunnel tomato cultivation at his farm appears to have great potential and the sub-sector is growing in terms of area expansion, value addition and market expansion. Moreover, off-season tomato production especially in the Hill districts is emerging as a highly profitable enterprise and more and more farmers are attracted towards commercial cultivation of tomato. Tomato cultivation has proved to have a high potential for employment generation at local level in general and for women and rural poor in particular. Despite these encouraging trends, the market is experiencing typical constraints of a growing and immature market. The tomato subsector shows the following characteristics:

- Increased price of major inputs such as plastic sheet, seeds, fertilizer, pesticides
- Severe price competition with imported fresh tomato from India
- Limited value addition (We can increase by processing as well as grading and packaging)
- Supply and price variation due to seasonality of the product
- Lack of proper information on market demand
- Heavy wastage during road blockades and strikes
- Losses due to inappropriate packaging and transportation

To address these classic problems of an agricultural commodity, the world today emphasizes value-added agriculture. Value addition of tomato can be created in any one or a combination of the following measures:

- A change in the physical state or form (such as making tomatoes into paste, puree, juice or ketchup).
- Production of tomato in a manner that enhances its value (such as off-season tomato or organic tomato).
- The physical segregation for enhancement of the value/product differentiation (such as an identity preserved marketing system – tomatoes of high hill/mountain/altitude)
- Storage of tomato so that it enhances value when the product is not available and market price is high (cold storage)

- Special packaging (packaging materials prepared from local product like bamboo) of tomato (1 kg, 2 kg, 5 kg tomato package)
- Increase export to Indian market
- Making agricultural financing even more convenient to rural farmers

### **Potential Interventions**

There is substantial scope for expanding the area of production and market. The highly favorable climatic condition for the production of high quality tomato as well as very close to Kathmandu, has a capacity to attract private sector investment in this sub-sector. Product standardization and quality assurance can significantly increase the value addition and competitive advantage to local producers. And last but not the least, increased coordination, networking and harmony with concerned stakeholders/line agencies can minimize internal rivalry and help tap specialized opportunities.

On this basis, the following recommendations and interventions are proposed for the development of the sub-sector:

#### **1. Infrastructure development**

- Construction and expansion of collection centers near the Dhading district such as Gajuri to Dharke on the road side and also construction of warehouse/storage
- Establishment of tomato processing plant in Dhading district, preferably on the road side of the Dhading to Kathmandu highway.
- Construction, expansion, repair and maintenance of social physical infrastructure like farm-to-collection center roads and market link roads, especially in VDCs linked with collection centers.
- Appropriate agricultural farm machinery/equipment for weeding and pruning

#### **2. Non-infrastructure investments**

- Ensuring the availability and affordability of quality inputs
- Subsidy from government for inputs especially for plastic sheet, drip irrigation, irrigation canal
- Continuity of interest subsidy from government
- Training to producers on cultivation practices, optimum utilization of drip irrigation, Israeli production technology, IPM, use of pesticides and fertilizers, grading and packaging, and marketing
- Technology transfer for value addition (pickle making, fruit or vegetable drying or preservation, tomato pulp making etc.)

#### **3. Other Interventions**

In addition to these, assistance will be needed in the following areas as well:

- **Capacity Development on Improved Production Process:** Improve farmer's knowledge and capacity on improved and scientific cultivation practices such as tillage/minimum tillage practice, seedbed preparation, mulching, appropriate dose and application technique of fertilizer and pesticide, drip irrigation technology, application of fertilizer, bio-chemical through drip irrigation, Integrated Pest Management, water management, staking, harvesting and post-harvest handling techniques.
- **Value Addition of Tomato:** To provide opportunities for the farmers to obtain relatively better price through storage of tomatoes during peak season when the price is low, to minimize losses during road blockade/strike as well as to increase demand of tomatoes by

setting up tomato processing plant for making juice, paste, ketchup and sun-dried tomatoes.

- **Backward and Forward Linkage:** Coordinating the markets of inputs, technology and outputs from service providers; input traders to producer and from producer to tomato traders, processors and final consumer.
- **Strengthening and Developing Effective Business plan:** Five years business plan of his tunnel tomato production enterprise should be prepared and implemented effectively.
- **Mainstreaming Gender in Tomato Production:** Women represent a significant portion of those engaged in production practices and post-harvest handling of tomato and tomato products, but they do not have adequate access to knowledge and information. Assistance will be needed in ensuring the mainstreaming of gender in this respect.

## CHAPTER 4

# Summary, Recommendations, Conclusion and Implications

### 4.1 Summary

Agriculture value chain financing has been observed as an important way of improving agriculture productivity. It is major tool to link various actors within the chain and develops linkages among the chain. Nepal being heavily dependent upon agriculture and majority of manpower involved in this sector for sustainable economy must give full attention on the implementation and improvement of the value chain in agriculture. The agriculture financing is important in Nepalese agriculture sector in the sense that whether small or medium cultivator and producer, all lack adequacy of finance on their own. Also, in absence of education, lack of financial literacy and unawareness of other skills the farmers are not familiar with the credit facilities and sources of credit. Therefore, the Nepalese farmers have to turn to either informal financing which is highly prevailing in rural areas where farmers depend upon the money lenders, friends and relatives which is so high interest instrument that most of the time farmers end up with no savings at the end of the production season.

The semiformal sector prevails in most of the districts now to help farmers and finance them during agriculture needs with less hustle and helps them to stand upon their own feet. The cooperatives, microfinance institutions, small farmer banks and others are there to help them. The number of members in the cooperatives is increasing throughout the years. Saving and Credit Cooperatives Society (SACOOS) are also helping the farmers by providing training and supporting in building their capacity.

The AVCF includes integration of every important links in the chain of agriculture production until the production reaches to the ultimate consumers. It constitutes actors supplying input, the producers, the traders and others. The financing could be self-financing, internal or direct financing, external or indirect financing, ADBL is supporting the farmers in financing in every aspect.

The study tried to focus on recent developments in AVCF in Nepal. This project aim to identify and document the best practices and innovations on value chain finance in three different areas of agriculture in Nepal, that are, floriculture (Carnation), vegetables (Tomato) and aquaculture (Trout fish).

An analytical approach was adopted to achieve the objective of the project. Literature survey was conducted in which major studies and government and non-governmental policy and research publications were reviewed, Extensive field survey was also conducted in Chitlang, Dhading and Kakani for Carnation, Tomato and Trout.

### 4.2 Summary and Recommendation based on Desk Review

The VCF is not a panacea. There are lot more factors leading to increase in agriculture productivity that enhances the economic level of people involved and reduction of poverty level and hence the improvement of national economy. Among the important factors are: the farmers and other actors involved in the agriculture value chain, making the financial access convenient and cheap and the supporting organizations that include the government and its policy.

#### **4.2.1 Farmers and Actors within the Agriculture Value Chain**

Nepal is experiencing depopulation and scarcity of agriculture land due to enormous previous reasons and the massive earthquake in the country. The young population migrating out of the country is resulting in the lack of agriculture labor in the country. Although remittance is increasing but it is not being invested in productive activities. The land previously in agriculture use in urban sector is now growing as the residential areas. In this way the number of agriculture labor as well as the agriculture land is also decreasing in Nepal. In the budget speech 2016 government of Nepal has emphasized on the proper land use in the country and has decided for penalty up to 25 percent of the crop production for the unused agricultural land.

Many farmers in rural as well as in urban sector also are not aware of many government policies regarding the trainings provided for their capacity development and about the agriculture credit and the facilities being offered by the financial institutions. FNCCI/AEC and other institutions support farmers on this regard and help making business plan. The integration among input suppliers to the farm producers, the traders and the market are the major role of AEC.

Lead Farmer and Local Resource Person (LRP) concept in particular product is experienced as a best example to empower farmer and should be continued. Introduce farmer marketing schools (FMS) program to support the development of commercial agriculture and value chains in those areas where prioritized value chain development activities are planned through national programs of Agricultural Development Strategy.

#### **Making Financial Access Convenient and Cheap**

Poor financial literacy is a big problem in Nepalese agriculture sector. Proper training to the needy about the credit and other aspects can empower the farmers. Minimum interest rate of the credit is the best way of supporting farmers in rural sector. According to monetary policy of NRB-2015, it states that making a provision of allowing credit up to certain amount to projects such as agriculture business like coffee, orange, tea and livestock and dairy products against the collateral of project itself on the basis of viability. The outreach of the needy farmers can be increased by the banks going deep into the unreached areas (reaching to unreached). The cost of borrowing could also be minimized by reaching to the doorsteps of the farmers. The branchless banking is the best way to support the farmers at rural sector.

In areas where microcredit agencies, I/NGO's and other agencies are working have more duplication of credit and in some areas the credit agencies are not reached. This has to be carefully planned and the outreach can be maximized.

#### **Government and Key Institutions**

The institutions like MoAD, DoA, NARC, MOFS, ADBL, NRB, the key farmer associations and key cooperative institutions need to be activated which is the prime concern in ADS strategy.

Government and the good governance is the basic need to improve overall environment in AVCF in Nepal. Promote development of market infrastructure through the combination of public investment, private and cooperative sector investment, PPP, and community participation, focused on the development of prioritized value chains.

#### **Risk Management**

There are various risks involved directly or indirectly in agriculture sector that can be minimized by managing following parameters.

**Market/Price Risk:** Flexible price risk is inevitable in any production. Market Information System, Contract farming could be a way out for this situation.

**Crop Weather Risk:** The natural causes such as drought, flood, and man-made disaster sometimes are greater risk in cropping. The insurance of the crops for such situation can protect the farmers from going broke.

**Collateral Risk:** Hypothecation and mortgages, cash-flow based lending can be suggested for collateral risk of both lenders and borrowers.

**Production Risk:** Diversification or multiple cropping can be safer in minimizing risk of farmers.

## 4.3 Recommendations based on Case Studies

### Agriculture focused financing policy

Government of Nepal is implementing special interest subsidy (interest rate up to 6 percent only by providing 4 percent interest subsidy to related bank) policy for youths for their involvement in commercial agriculture since last FY, it has very positive impact among the youth farmers, thus it should be continued at least for another 3 years. Of course, this is one of the outcome of the "Policy dialogue on Agricultural Value Chain Financing" jointly organized by FinServAccess project of APRACA, Nepal Rastra Bank and Agricultural Development Bank Ltd. from September 3-4, 2013.

### Crop insurance

Tomato, Carnation, Trout crop are very sensitive to climate change and natural disasters like earthquake, draught, landslide, flood, epidemic outbreak of disease. Moreover, it is perishable commodity and thus is very sensitive to fluctuation in price. Many farmers have to face loss in agriculture enterprise due to loss incurred due to these natural calamities and price fluctuation. Thus, crop insurance program implemented with the 75 percent premium subsidy from Government of Nepal is one of the most appropriate for promotion of agriculture sector. However, many rural farmers are unaware of this program as well as about bank interest subsidy. Therefore, rural youth/farmers should be part and be aware of these government facilities and services.

### Subsidy in import of raw materials and export of final products

- **Carnation** cut flower is an export crop and the raw materials such as the seed and others are imported from India and abroad. The export of cut flowers specially carnation from Nepal experiences lot of problems among which are the lack of cold storage at airport and high tax.
- **Rainbow trout** has high potential of exporting specially the dry-trout. Trout has potential of value addition by using dry-trout as in dry-meat and can be exported as the life of dry fish is high. The dried fish after packaging can be exported also with great value addition. And the seed and feed are imported.
- **Tomato** if processed into juice and other products has big market outside the country. Government support in the form of subsidy in tax for these crops will contribute to involvement of more farmers in this sector.

## 4.4 Conclusion and Implications

Three significant agricultural value chain finance cases in Nepal particularly on carnation, rainbow trout and tomato were analysed and documented by highlighting the support extended by the Agricultural Development Bank Limited (ADBL) to its farmer-clientele as well as their experiences.

These analyses were done with the help of APRACA through the financial assistance of IFAD FinServAccess Project. Based on this, the individual reports were integrated to describe the status, strategies and activities of the different farmers supported by ADBL. The research documentation include qualitative and quantitative methodology in collecting pertinent data which were analysed and interpreted using key informant interviews, focus group discussions, content analysis, observations and case studies.

Results show that that ADBL financial support on carnation, rainbow trout and tomato are very important commodities in the country. Carnations are marketed domestically and internationally to increase utilization cutflowers as well as the production and profitability of farmers. Rainbow trout which is very popular mostly in the upland areas are expanding as a source of additional livelihood for food and nutritional requirement of local people. Several aquaculture ponds are already set-up across the upland and hilly areas of the country. With ADBL's technical and financial support, more and more rural people benefitted. In the case of tomato, off-season production was practiced with the technical support from local agriculture offices and ADBL branches. All financial products and services were improved to address the needs of the farmers, traders, entrepreneur as well as the local communities.

One interesting aspect about these ADBL cases is the institutionalization of technical partnerships with networks and associations. The Floriculture Association of Nepal (FAN), Fisheries Association of Nepal and Vegetable Association of Nepal (VAN) provided informal and formal assistance in particularly on the technical aspect of production and marketing.

Although affected by natural disasters and calamities over the years, especially the recent April and May 2014 earthquake, the government, ADBL and other partners continue to support the operation of these commodities and further support other competitive products for availability, affordability and sustainability aspects to improve the conditions of the rural people especially those who are already engaged as their steady source of livelihood.

In addition, the Government of Nepal has developed strong strategy to enhance the agriculture sector as the prime sector towards improving national economy other institutions like Agricultural Development Services and Agricultural Fisheries Extension Services of the Ministry of Agriculture and Rural Development, Nepal Rastra Bank together with the other Nepal financial entities a the main and local branches.

Thus, irrespective of enormous constraints experienced, the collective efforts of the farmers, government and public/private sectors will continue to address the challenges and enable the clientele to produce quality goods by finding very good markets within and outside of the country. After all, it is the desire of all entities to improve the status of the key players and stakeholders in the rural and agricultural sector that will ultimately result in poverty reduction and gear up the national economy of the country.

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